cycles

November 1954

FOUNDATION FOR THE STUDY OF CYCLES
New York, New York

CONTENTS

Page

DIRECTOR'S LETTER 307

RESEARCH

The Modified Geisinger Indicator of Industrial Production . . 309
The 22 2/3-Year Cycle in Grasshopper Outbreaks 316
The 9.6-Year Cycle in the Acreage of Wheat 320
Cycles in Automobile Sales—Continued (The 36-Month Cycle) . . 321

LETTERS 324

SUPPLEMENT

Emotional Cycles in Man, by Rex B. Hersey 325

THE FOUNDATION FOR THE STUDY OF CYCLES

The Foundation is a not-for-profit corporation, the board of directors of which consists of the following committee:

UNITED STATES OF AMERICA

Copley Amory, Chairman Emeritus

Charles Greeley Abbot
Research Associate
Smithsonian Institution

Harold Elmer Anthony
Chairman and Curator
Department of Mammals
American Museum of Natural History

George Baekeland, Chairman of the
Committee of the Foundation
The Bakelite Corporation

Harold Gardiner Bowen
Vice, Admiral, U.S. Navy, Retired
Executive Director, Thomas Alva
Edison Foundation

Verne Burnett
Partner
Verne Burnett Associate

Hon. W. Cameron Forbes
Member, Board of Trustees
Carnegie Institution of Washington;
Life Member of the Corporation,
Massachusetts Institute of Technology

Webster N. Jones
Vice President
Carnegie Institute of Technology

Daniel Trembly MacDougal
Former Director
Department of Botanical Research and
Laboratory of Plant Physiology
Carnegie Institution of Washington

John Quincy Stewart
Professor of Astronomical Physics
Princeton University

CANADA

Hon. Charles Camsell
Former Commissioner
Northwest Territories

Frank Cyril James
Principal and Vice-Chancellor
McGill University

GREAT BRITAIN

Sir Patrick Ashley Cooper
Governor
Hudson's Bay Company

Julian Sorell Huxley
Former Director General
United Nations Educational, Scientific and Cultural Organizations

Edward R. Dewey, Director

Cycles is published by the Foundation for the Study of Cycles every month except during July and August at the Foundation's office at East Brady, Pennsylvania. Subscription rate $10.00 a year. Entered as second class matter at the post office at East Brady, Pennsylvania, with additional entry at Ann Arbor, Michigan. Publication office, 680 West End Avenue, New York 25, New York.

cycles

The official Bulletin of the Foundation for the Study of Cycles

VOLUME V NUMBER 9 NOVEMBER 1954

The Director's Letter

Dear Member:

We recently received the following letter from Chile:

Cydes Study Fundation
Dear Sir:

I had notice for a press articule of the Studies did it for this fundation about the cydes aspect of the human history and his progress.

I have a big interest to read the publication of this fundation, I thank you let me know the price and the form that I cam get it.

Sincery yours,
x--------

I am flattered.

I am also ashamed. The worthy señor was able to address me in my language; I am unable to reply to him in his, even in less than perfect Spanish.

The Geisinger Indicator

The Geisinger Industrial Production Indicator seems to be making a ten-strike. We have had a number of letters about it. For example, an official of one of the large steel companies wrote, "While looking, with my usual interest, through the latest issues of "Cycles", I read your note about the "Geisinger production indicator." This represents just the kind of thing tnat we are looking for,...."

I have a little indicator of my own, which, when added to the Geisinger Indicator, seems to make it even better. See the article immediately following this letter.

Cycles in Human Emotion

Perhaps because all of us are human beings, there seems to be something of irresistible interest in the rhythms of human emotion.

Foundation Reprint No. 3, "Emotional Cycles in Man," by Rex B. Hersey, is one of the most popular publications we ever issued.

However, the work of Professor Hersey, a pioneer in the field, is more than interesting. It is significant. And if, as seems probable, all men have this regular alternation of exhilaration and depression, Professor Hersey's work shows us how, by finding our own cycles, we can forecast our own emotional states long in advance of the event.

Do women have these cycles or rhythms that Professor Hersey speaks of in addition to the four-week and two-week cycles of sex desire that have been noted? Are the rhythms for any individual immutable in length? Where two or more persons have rhythms of identical length, do the peaks come at the same calendar time?

Are there longer rhythms of six months, a year, two years, three years that Professor Hersey's methods are not designed to bring out? Do some individuals have two or more rhythms present concurrently? Are there rhythms of identical length in the ups and downs of phenomena that, by their existence, might give a hint as to possible cause for the emotional rhythms discovered by Professor Hersey? These are some of the questions that come to mind as one reads his paper.

In response to insistent demands (because this publication is now out of print), and to give you a bit of relief from the monotony of successive chapters of *Cycles: The Science of Prediction*, we are reprinting "Emotional Cycles in Man" as this month's supplement.

Doubles His Money

In New York the other day I had lunch with one of our members who trades in the stock market solely on the basis of regular short term cycles. He told me that for a number of years now he has doubled his money every year.

He knows nothing about cycles except what he has learned from our monthly reports, and what he has been able to pick up for himself.

The success of this member stimulates me to renew my stock market studies and to supplement my long term stock market cycle work of 1944 with a study of short term stock market cycles.

The member of whom I speak told me further that his real profit came from applying a knowledge of cycles to the behavior of individual stocks. This information supports my own findings. I, too, have found that cycles in individual stocks are often clearer and more dominant than cycles in the market as a whole.

The Roller Coaster Idea

People's ideas change slowly, but they do change.

In 1937, when I was first trying to sell the idea of cycles, I found very little *emotional* acceptance of the idea that business curves go up and down like the track of a roller coaster.

When business was going up, the *emotional* reaction of most top management was, "Hurrah! our troubles are over." When business was going down the *emotional* reaction was 'My God! Ruin ahead."

Only one firm out of about a hundred leading firms that I contacted at that time had the emotional stability to look behind the beyond, as it were. Executives of this firm had the attitude 'Business is booming. Let's beware the decline which will surely follow." 'Business is falling. Let's expand so as to be ready for the coming advance."

Now all of this is changed. I find the idea of cyclic ups and downs--the inevitable roller coaster of business--quite generally a part of the warp and woof of business thinking. What part, if any, the Foundation for the Study of Cycles may have had in bringing this change about I do not know.

The next step is to get business men to realize that at least some of these roller coaster ups and downs come at *regular time intervals*. When this fact also has achieved widespread recognition, the study of cycles will have come into its own.

Cordially yours,

Edward R. Dewey
Director

THE MODIFIED GEISINGER INDICATOR OF INDUSTRIAL PRODUCTION

FOR two issues now I have been printing for you the Geisinger Indicator of Industrial Production. In the past this indicator has turned about 9 months ahead of the F. R. B. Index of Industrial Production. It has, therefore, thrown light on the probable future behavior of that index.

For some months this indicator has shown strength. This suggests better business for the months immediately ahead.

The Geisinger Indicator, with up-to-the minute comment, is printed for you on the two pages next following (pages 310-11).

I also have a little indicator of my own which has worked fairly well in the past. It is based on different principles. It is not based on cycles as such, but it works because cycles behave the way in which they do.

It occurred to me that if we combined the two indicators we might come up with something better than either. I have made this combination.

The three indicators—Mr. Geisinger's, mine, and their combination—are printed for you on pages (312-13). Below I have reprinted, for comparison, the F. R. B. Index.

You will note that the indicators have no trend. They oscillate around a horizontal axis. They just give advance warning of *turning points*. You can evaluate the indicators better if we express the F. R. B. Index as deviations from trend. Therefore, I have drawn in a freehand trend line for the F. R. B. Index (the broken line on pages 312-13) and have figured for each month how much the actual F. R. B. Index was above or below this trend. These plus and minus deviations are recorded on pages 314-15, along with the Modified Geisinger Indicator.

On pages 314-15, I have also shown the Modified Geisinger Indicator slipped eight months to the right (the Modified Geisinger Indicator does not seem to have quite as much lead as the Geisinger Indicator).

The Modified Geisinger Indicator, like the Geisinger Indicator, shows strength into next year.

I hope these Indicators will prove of use to you in trying to outguess what is ahead for industrial production in this country.

E.R.D.

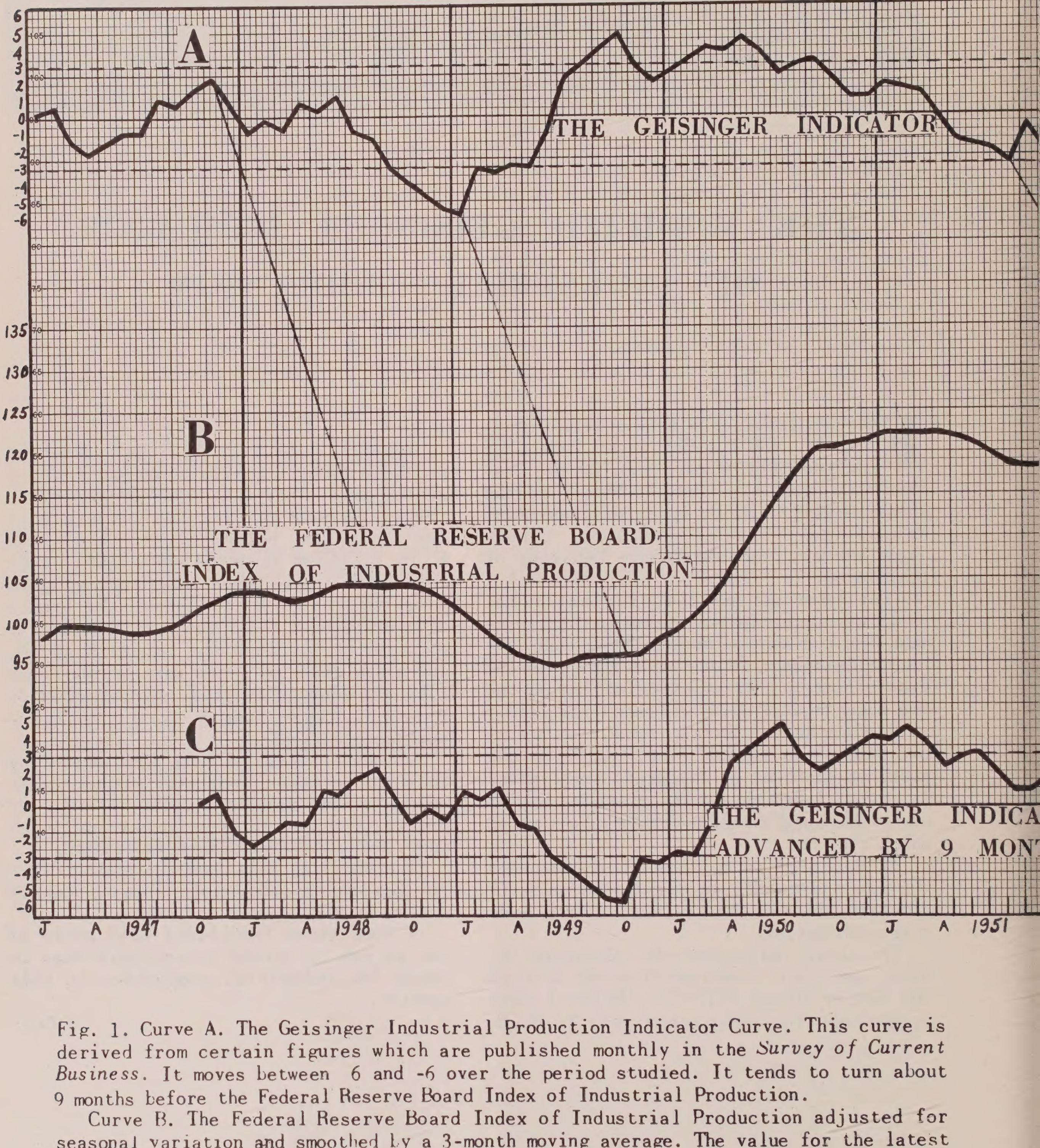
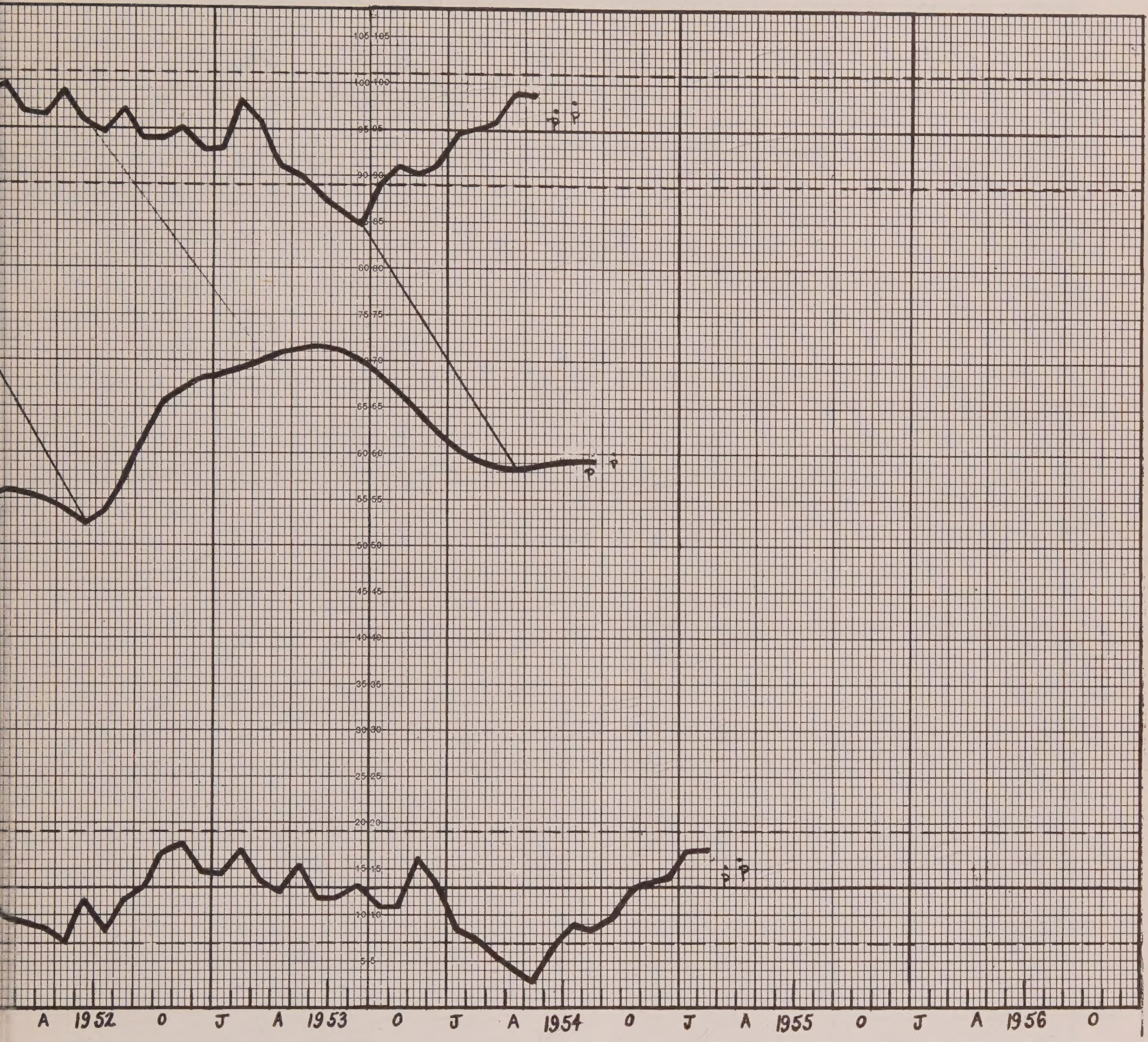


Fig. 1. Curve A. The Geisinger Industrial Production Indicator Curve. This curve is derived from certain figures which are published monthly in the *Survey of Current Business*. It moves between 6 and -6 over the period studied. It tends to turn about 9 months before the Federal Reserve Board Index of Industrial Production.

Curve B. The Federal Reserve Board Index of Industrial Production adjusted for seasonal variation and smoothed by a 3-month moving average. The value for the latest available month is shown by a dot.

Curve C. This Curve is the Geisinger Industrial Production Indicator Curve advanced by 9 months. This process projects part of the curve into the future. If the relationships of the past continue, the projection gives some hint of what may happen to the Federal Reserve Board Index of Industrial Production (Curve B).

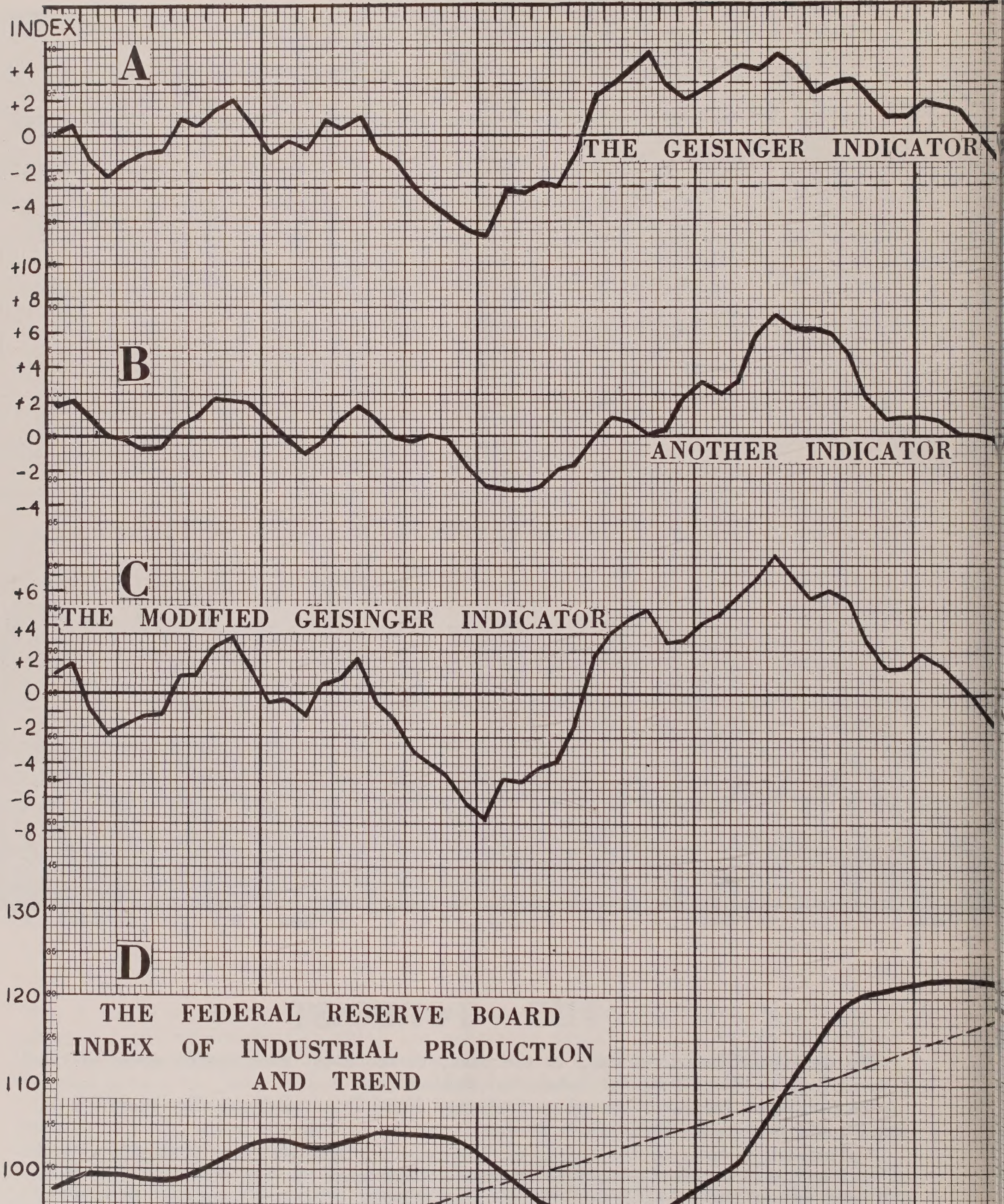


THE FORECAST

The Geisinger Indicator has, in the past, turned about nine months ahead of the Federal Reserve Board Index of Industrial Production.

The Geisinger Indicator turned up in August 1953. This suggested that the F. R. B. Index would turn up in April 1954. It did.

Preliminary figures of the Geisinger Indicator for June and July 1954 show values of +1.2 and +1.5 respectively. This is down a shade from the May value of +2.0. This set back is not too significant, but it does suggest a note of caution. It recalls what I told you in the August--September report, namely that "if the coming advance in business outtops the peak of May 1953 I shall be surprised. *E.R.D.*


INDEX
A
+4
+2
0
-2
-4
THE GEISINGER INDICATOR
+10
+8
+6
+4
+2
0
-2
-4
B
ANOTHER INDICATOR
C
THE MODIFIED GEISINGER INDICATOR
+6
+4
+2
0
-2
-4
-6
-8
130
120
110
100
D
THE FEDERAL RESERVE BOARD INDEX OF INDUSTRIAL PRODUCTION AND TREND
J
A
1947
O
J
J
A
1949
O
J
A
1950
O
J
A

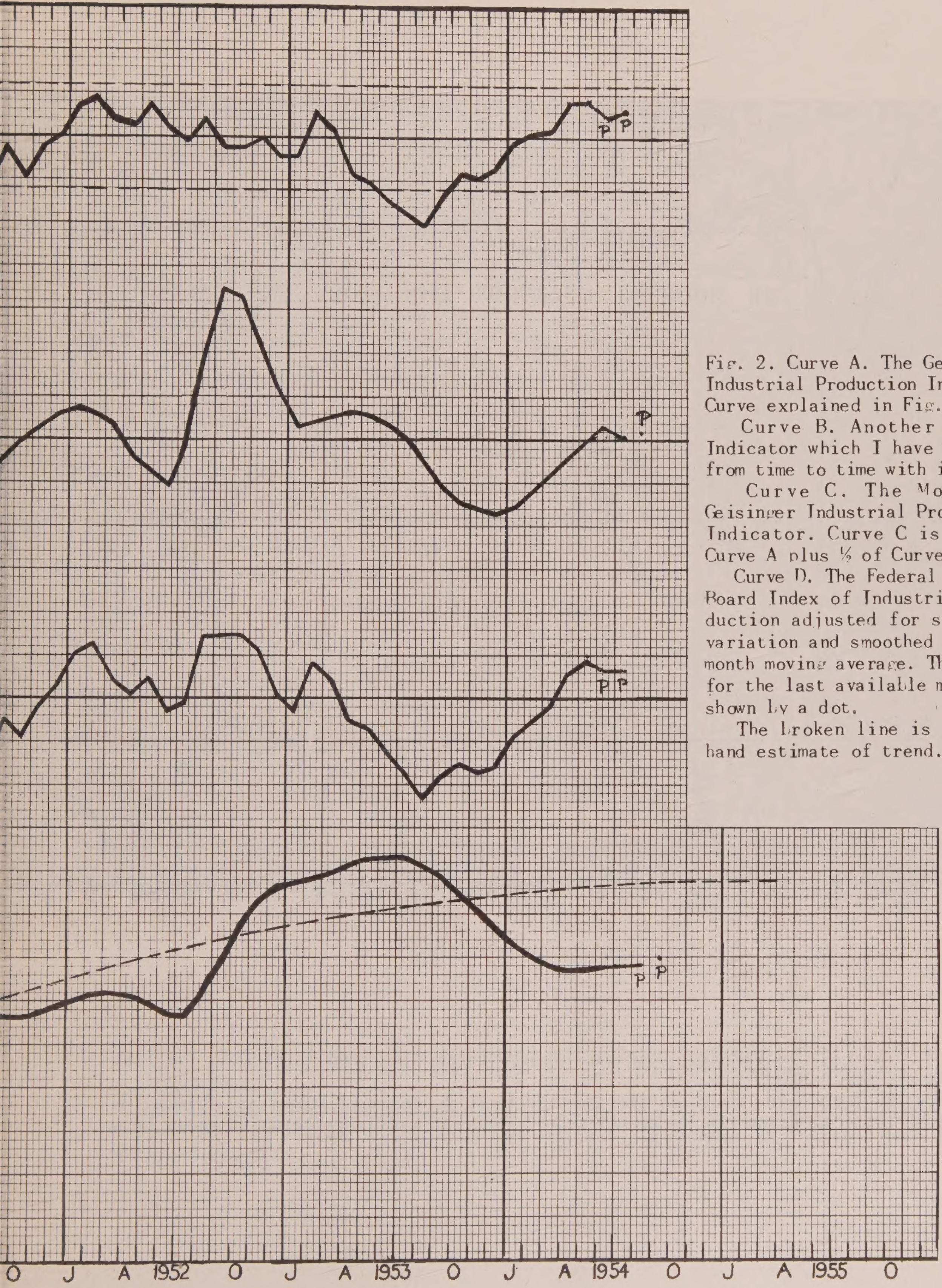


Fig. 2. Curve A. The Geisinger Industrial Production Indicator Curve explained in Fig. 1.

Curve B. Another little Indicator which I have watched from time to time with interest.

Curve C. The Modified Geisinger Industrial Production Indicator. Curve C is merely Curve A plus ½ of Curve B.

Curve D. The Federal Reserve Board Index of Industrial Production adjusted for seasonal variation and smoothed by a 3-month moving average. The value for the last available month is shown by a dot.

The broken line is a freehand estimate of trend.

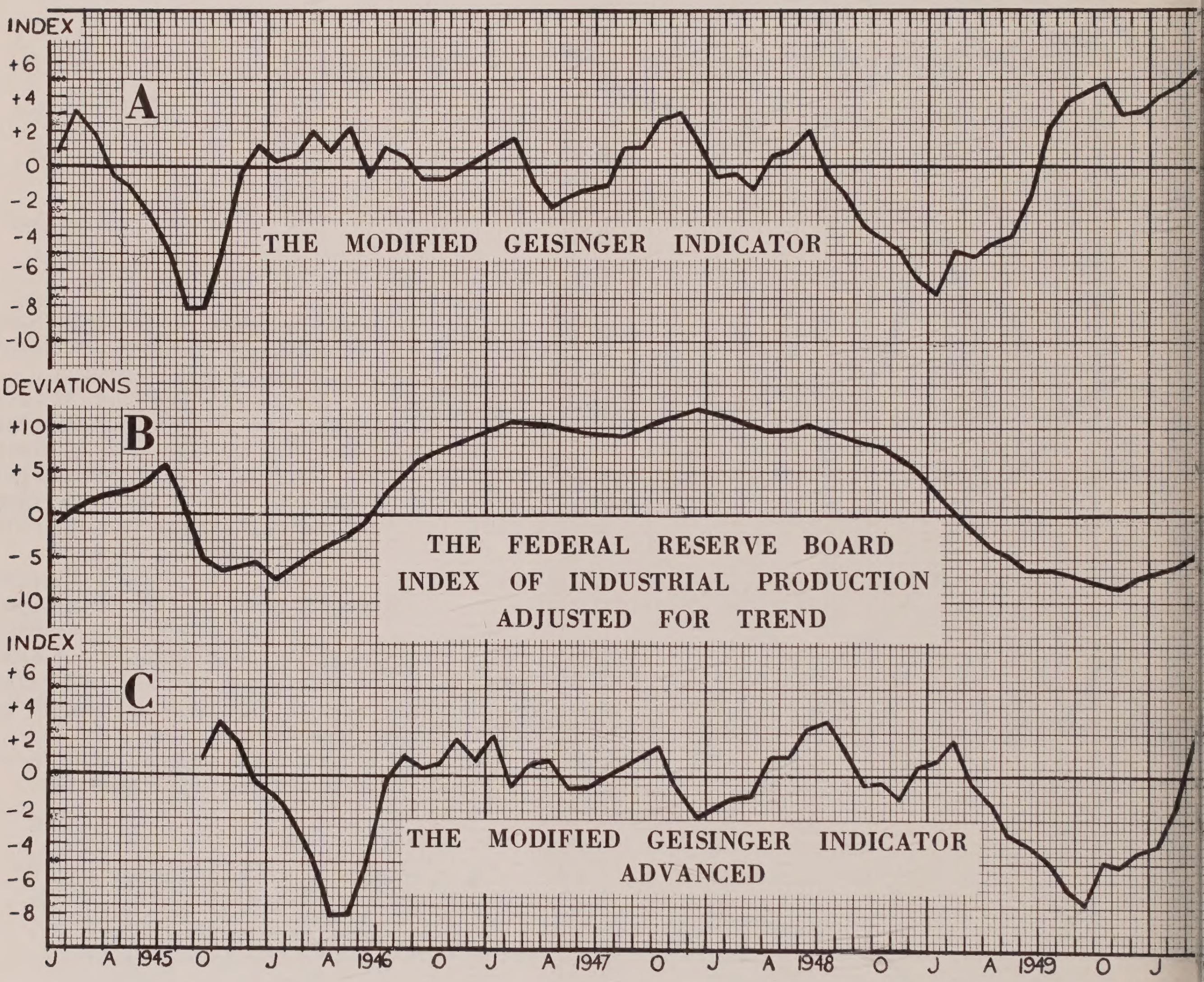
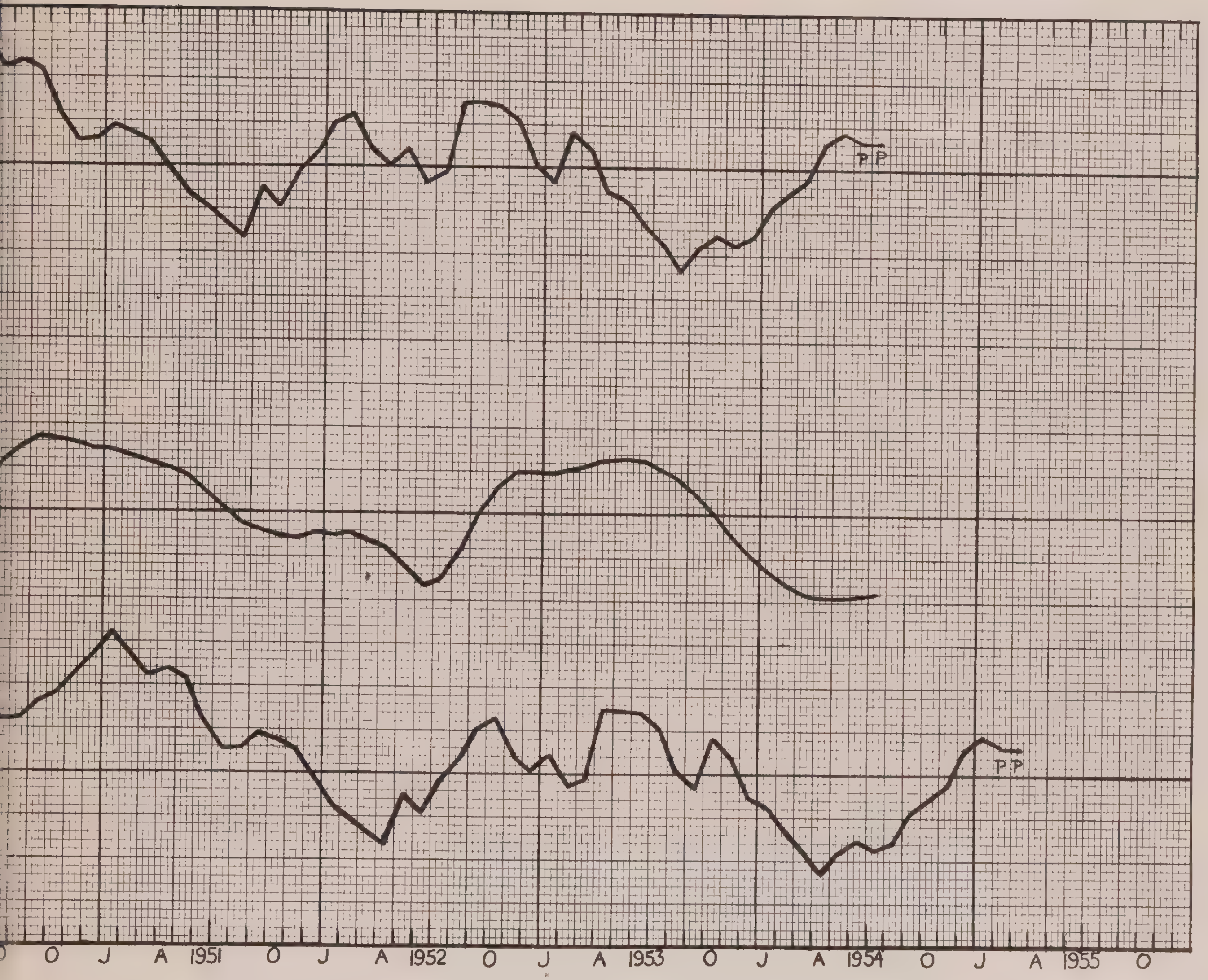


Fig. 3. Curve A. The Modified Geisinger Indicator as described in Fig. 2. The last values are preliminary.

Curve B. The amounts by which the smoothed F. R. B. Index of Industrial Production has been above or below the estimated trend. The last available value is shown by a dot.



Curve C. The Modified Geisinger Indicator advanced by 8 months. The last values are preliminary.

The behavior of the Modified Geisinger Indicator suggests a moderate advance for the next several months. As far as I can see into the future, this advance will be of modest proportions.

THE 22⅔-YEAR CYCLE IN GRASSHOPPER OUTBREAKS

IN our report for June-July 1953 I told you about a 9-year cycle in grasshopper abundance. Also, I promised to tell you more about a cycle roughly 21 years in length, likewise present in these figures.

The 9.2-Year Cycle

A re-study of the available data, using new techniques, convinces me that the so called "9-year" cycle is closer to 9.2 years long than to 9.3 years long. It thus corresponds in length to the pig iron price cycle. The timing however does not correspond. Crests in the 9-year grasshopper cycle come at 1939.5 and every 9.2 years forward and backward from that time. This is about two years after the crests of the 9.2-year pig iron price cycle. The revision of length gives average strength of 239% of trend at time of crest; 42% of trend at time of trough.

The Charts

Fig. 1 shows you the index of grasshopper abundance, 1841—1940, smoothed by a 3-year moving average. It also shows you the 9-year moving average trend.

Fig. 2 shows you the amounts by which the index values are over or under trend. It also diagrams the 9.2-year cycle.

The "21-year" cycle turns out, upon study, to be 22 2/3 years long. You can see it by inspection of the 9-year moving average trend in Fig. 1. You can see it better when the 9-year moving average is plotted without the raw data as in Fig. 3. (Fig. 3 shows you a 21-year moving average trend also.)

Fig. 4 shows you the amounts by which the 9-year moving average values are over or under the 21-year moving average trend. It pictures the 22 2/3-year cycle more accurately.

The 22 2/3-Year Cycle

To the grasshopper curve in Fig. 4 I have added a perfectly regular 22 2/3-year cycle to aid your eye. As you can see, crests come at 1849.0 and at 22 2/3-year intervals forward and backward from that time. The current low is at 1951.0.

If we assume that the 22 2/3-year cycle has the usual zigzag shape its strength is 271% of trend at time of crest, 37% of trend at time of trough.

You can see by inspection that another cycle (about 15 years long) is also present in these figures.

When the 15-year cycle (if that is its true length) has also been studied and removed, it will be possible to find out the trend. We can then combine for you the 9.2-year cycle, the 15-year cycle, the 22 2/3-year cycle, and the trend into a forecast of grasshopper abundance. Such a forecast can be improved by including any other cycles which may be present in the index.

If you have been reading our reports you may remember a number of references to cycles about 9.2 years long, about 15 years long, and about 22 2/3 years long.

The 9.2-Year Cycle Present in Many Things

Cycles about 9.2 years long have been discovered in many phenomena. There seem to be cycles of this length in the number of sun spots, in the alternate thickness of tree rings, in business failures, and in prices. All of this suggests that we are dealing with something which probably is pretty fundamental.

A 9.2-year cycle has been continuously present in **pig iron prices** since 1784. A cycle between 9.2 and 9.3 years in length has been continuously present in **copper prices** over the same period of time. A 9.2 year cycle has been continuously present in **industrial stock prices** since 1871; in **railroad stock prices** since 1831. A cycle about nine years long is reported for **venereal disease**, but this series of figures has not yet been studied by competent cycle analysts, as far as I know. The true length of the venereal disease cycle might be anywhere from 8½ to 9½ years in length (until our recent work the grasshopper cycle was called 10 years long). The liabilities of commercial and industrial **failures** have shown a 9.2-year cycle 1857 to date. **Wheat prices,** civil war days to the present, show a cycle which seems to be 9.3 years long. But study of wheat prices over a longer period might make the length 9.2 years long (or might not, I do not know). **Tree rings** at Santa Catalina, Arizona, tend to be thicker at 9.2-year intervals. This fact suggests a climatic factor with fluctuations of this length. And finally, the most refined study of **sun spot numbers** which I have been able to make so far also indicates an important 9.2-year cycle.

The 15-Year Cycle

As the 15-year cycle in grasshopper abundance will be treated in a later article, there is no need to discuss it in detail at this point.

The 22 2/3-Year Cycle

Dr. Abbot of the Smithsonian Institution reports 23-year cycles in the following phenomena:

1. In the width of sedimentary **rock deposits** laid down thousands and thousands of years ago (glacial varves).
2. In the widths of **tree rings in California** and the West.
3. In the **levels of lakes and rivers.**
4. In the **weather** of the United States.
5. In the widths of **tree rings at Fairlee, Vermont.**

Dr. Wing, a research fellow of the Foundation for the Study of Cycles, has discovered a 22 2/3-year cycle in the abundance of the **European Partridge.** It seems to be exactly this length throughout the 183-year period from 1727 through 1909. No figures are available after 1909. This cycle was charted for you on pages 110 and 111 of our report for April 1953.

Cycles from 22 to 24 years in length have been discovered in many other phenomena. But usually the period over which the figures are available is too short to enable us to know for sure whether the length is 22 2/3 years or a length slightly longer or shorter.

Among the phenomena reported to have cycles of this general order of magnitude are:

1. **Advertising efficiency** of a large medicine company,
2. **Postal receipts** at Milwaukee,
3. **Wholesale prices** in the U. S.,
4. The number of international **battles,**
5. The abundance of **Lynx** in Canada, and
6. **Sunspots** with alternate cycles reversed.

Conclusion: Grasshopper outbreaks act as if they were affected by rhythmic forces of 9.2, 15, and 22 2/3 years in length.

This fact enables us to forecast such outbreaks more accurately. This in turn enables us to combat this scourge more adequately.

Of even greater importance is the fact that we find these well known cycles once again. It shows us that we are surely dealing with something of fundamental importance.

Grasshoppers on the Rampage.

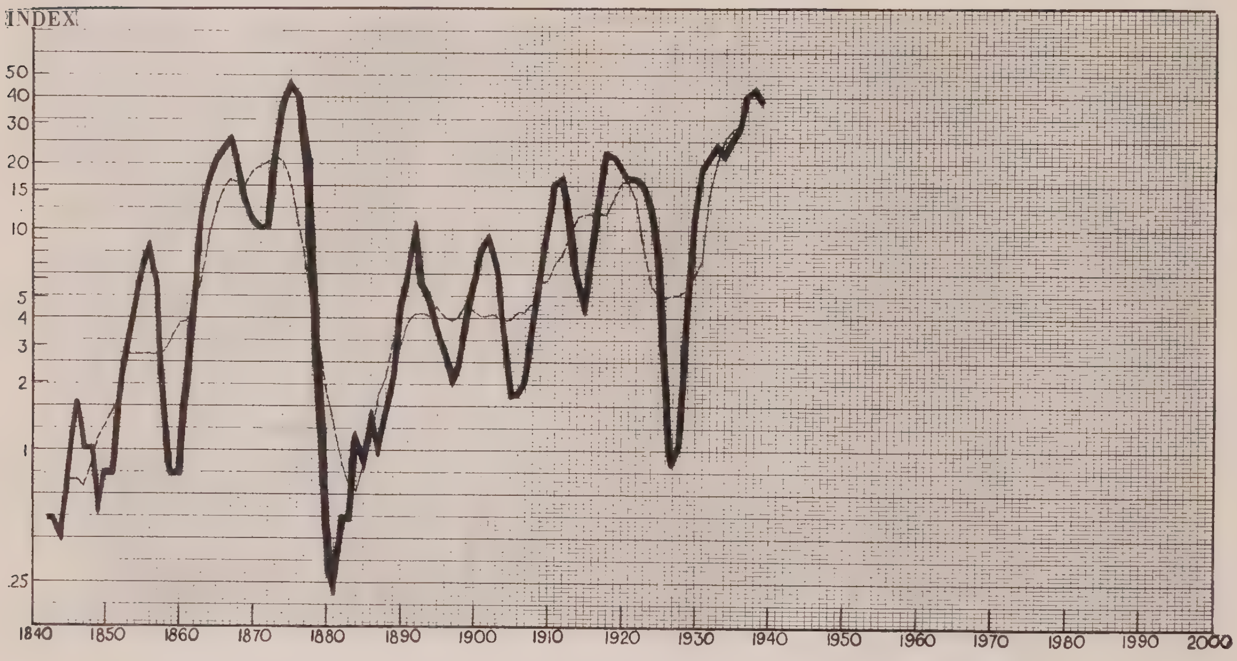


Fig. 1. Index of Grasshopper Plagues in the United States 1842--1939. Heavy line shows index. Broken line shows trend.
(For the Technician: The index values have been smoothed by a 3-year geometric moving average. The trend is a 9-year geometric moving average. Ratio Scale.)

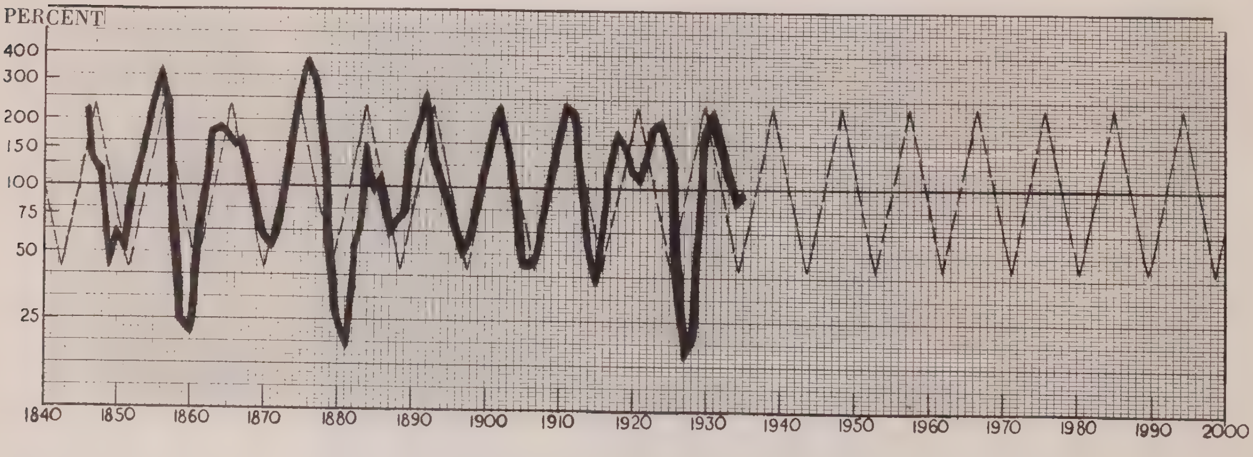


Fig. 2. This chart shows the 9.2-year cycle of grasshopper abundance. The heavy line represents the amount by which the index shown in Fig. 1 is above or below trend. The broken line shows a perfectly regular 9.2-year cycle added to aid your eye and to project into the future the minor fluctuations of grasshopper abundance in the United States, if this cycle continues. Ratio Scale.

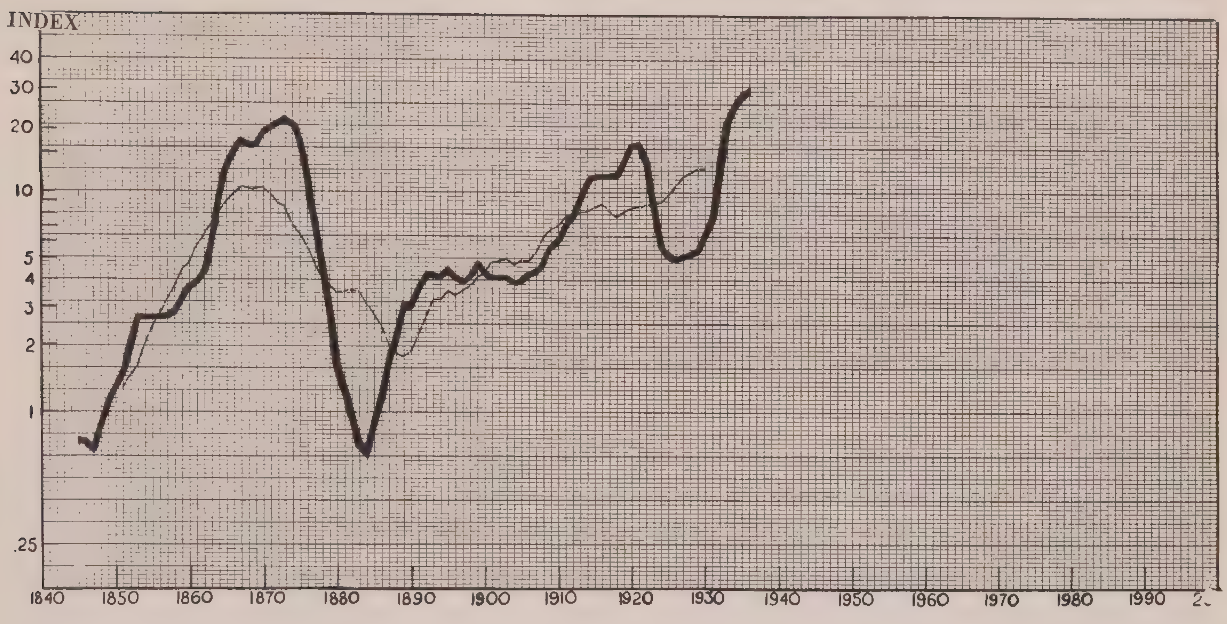


Fig. 3. This chart is a work chart to help us discover long cycles of grasshopper abundance.
(For the technician: The heavy line is a 9-year geometric moving average. The broken line is a 21-year geometric moving average. Ratio Scale.)

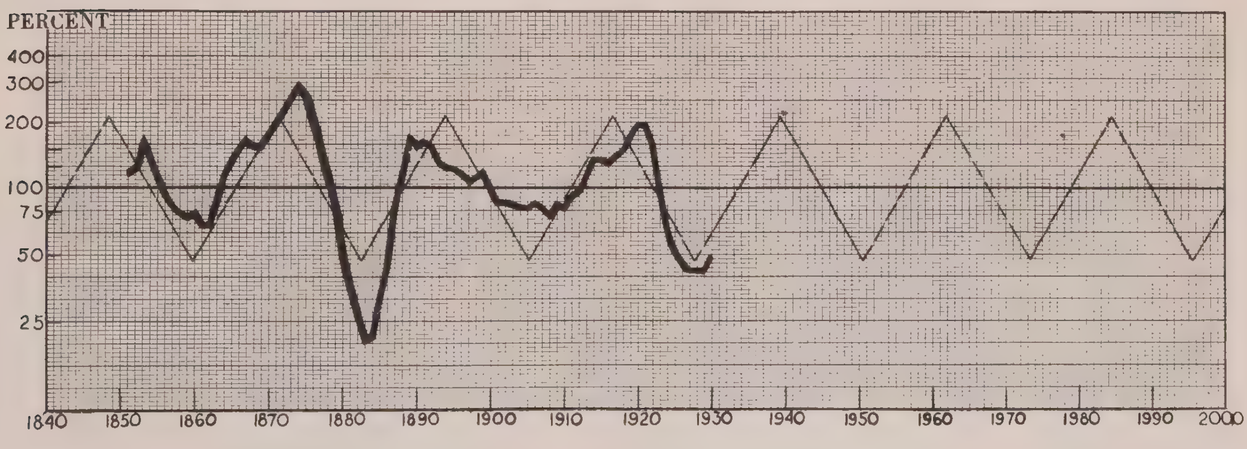


Fig. 4. This chart shows you the 22 2/3-year cycle of grasshopper abundance. The heavy line shows the amount by which the heavy line in Fig. 3 is above or below trend. The broken line is a perfectly regular 22 2/3-year cycle added to aid your eye and to show you the major moves of grasshopper abundance in the future if this cycle continues. Ratio Scale.

The 9.6-Year Cycle in the Acreage of Wheat

THE acres of wheat harvested for grain are due to increase irregularly from about 1953 to about 1958.

This statement is based upon the fact that wheat acreage since 1866 (the earliest available figures) has shown a strong clear 9.6-year cycle.

We announced the discovery of this cycle in our report for May 1951. See that issue.

The charts below show the cycle in the figures adjusted for trend. They also show how the curve unfolded for 1950, 1951, and 1952.

Why should men plant and harvest grain in a cycle which has the same wave length as the cycle which dominates the abundance of Atlantic salmon, snowshoe rabbits, and Canadian lynx? We do not yet know, but there is no mistaking the fact that, for as long as figures are available, they have.

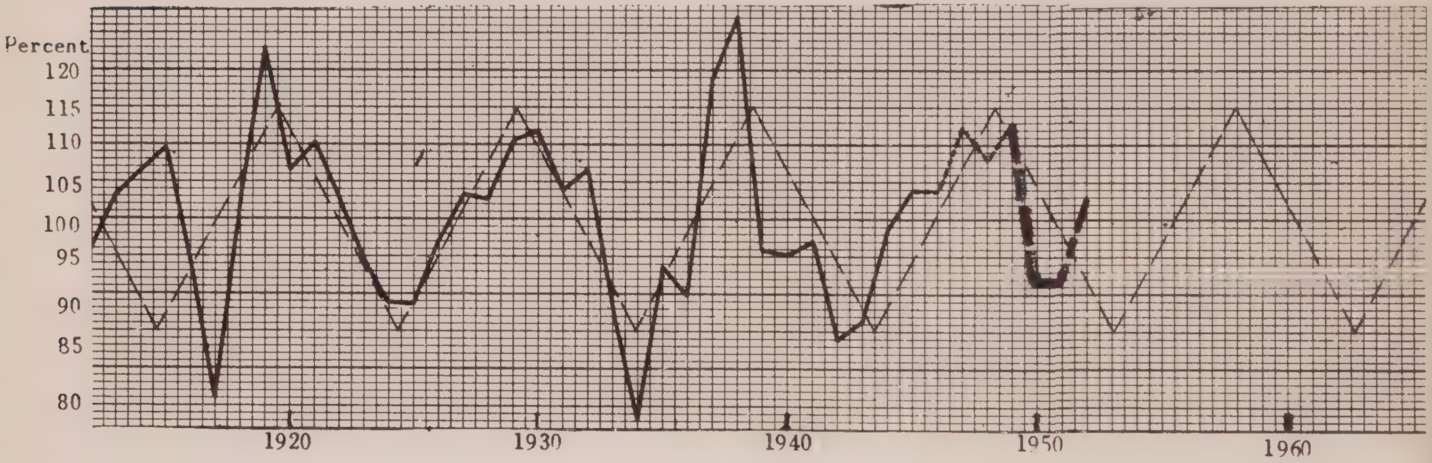


Fig. 1. Wheat Acerage, U. S. A. The solid line shows the percentage by which the acerage of wheat was above or below trend for the years indicated. The broken zigzag line diagrams the 9.6-year cycle.

This chart is part of a curve which was first printed for you in our report for May, 1951. The heavy line 1949-1952 shows how the acerage figures unfolded during the next three years.

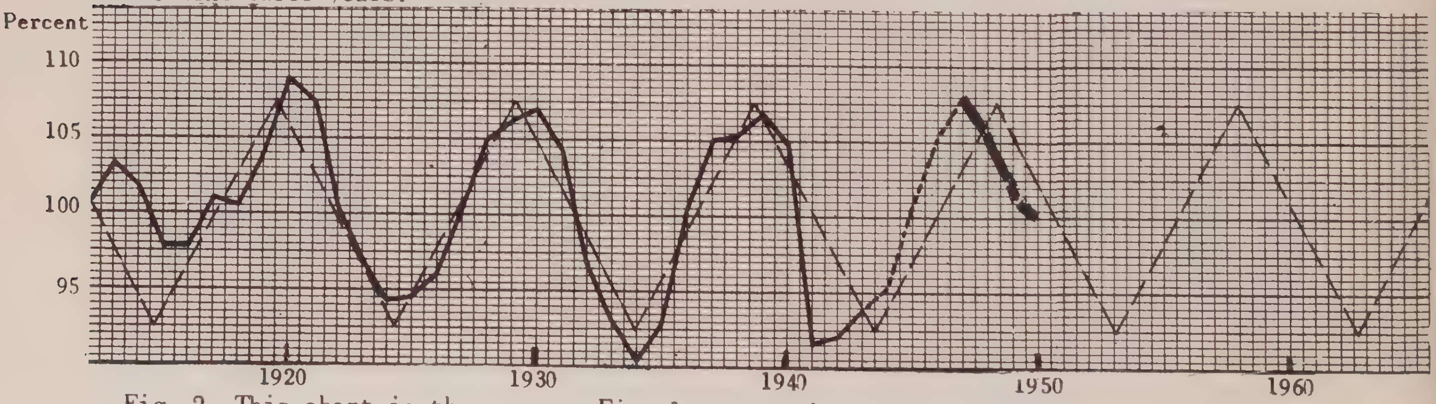


Fig. 2. This chart is the same as Fig. 1 except that the curve of wheat acerage has been smoothed by a 5-year moving average. This process makes it two years shorter.

CYCLES IN AUTOMOBILE SALES--CONTINUED

THE 36-MONTH CYCLE

SUMMARY

In addition to the 41-month cycle in the factory sales of passenger cars reported upon last month there has been, for as far back as figures are available, a 36-month cycle. This cycle is going up at the present time. It should help make the 41-month decline normally due at this time less severe than usual. There is likewise in these figures a cycle about 23 1/3 months long. This cycle is due to go down for the next year or so. When the 23 1/3 month cycle has been isolated it should be possible to make a tentative forecast.

LAST month, in discussing the 41-month cycle in the factory sales of passenger automobiles I told you that there was another shorter cycle also present in these figures.

This shorter cycle turns out to be 36 months long. It has the following characteristics: Strength at month of crest, 114% of trend. Strength at month of trough, 88% of trend. Ideal timing: crests at January 1914 and every 36 months thereafter. This puts the last crest of this cycle ideally at January 1953; the current trough ideally at July 1954; the next crest ideally at January 1956.

You can see this cycle for yourself in the deviations from trend after these deviations have been adjusted for the effect of the 41-month moving average, as in Fig. 1, and smoothed.

The fact that this cycle is going up at the present time mitigates the downward effect of the 41-month cycle discussed last month.

The combined effect of the 41- and the 36-month cycles is shown in Fig. 2.

Fig. 3 shows the smoothed actual monthly sales of passenger cars, adjusted for trend, in comparison with this compound pattern. Obviously the pattern made up of the 41- and the 36-month cycles in combination fits the actual behavior much better than does the 41-month cycle by itself. (The 41-month cycle by itself was shown in the October report.)

After we adjust for the effect of the 36-month cycle still another cycle appears. It is about 23 2/3 months long. As nearly as I can tell from the work to date it will be going up until about April 1955. I shall tell you more about it in the next report.

It is important that you understand just what the charts picture.

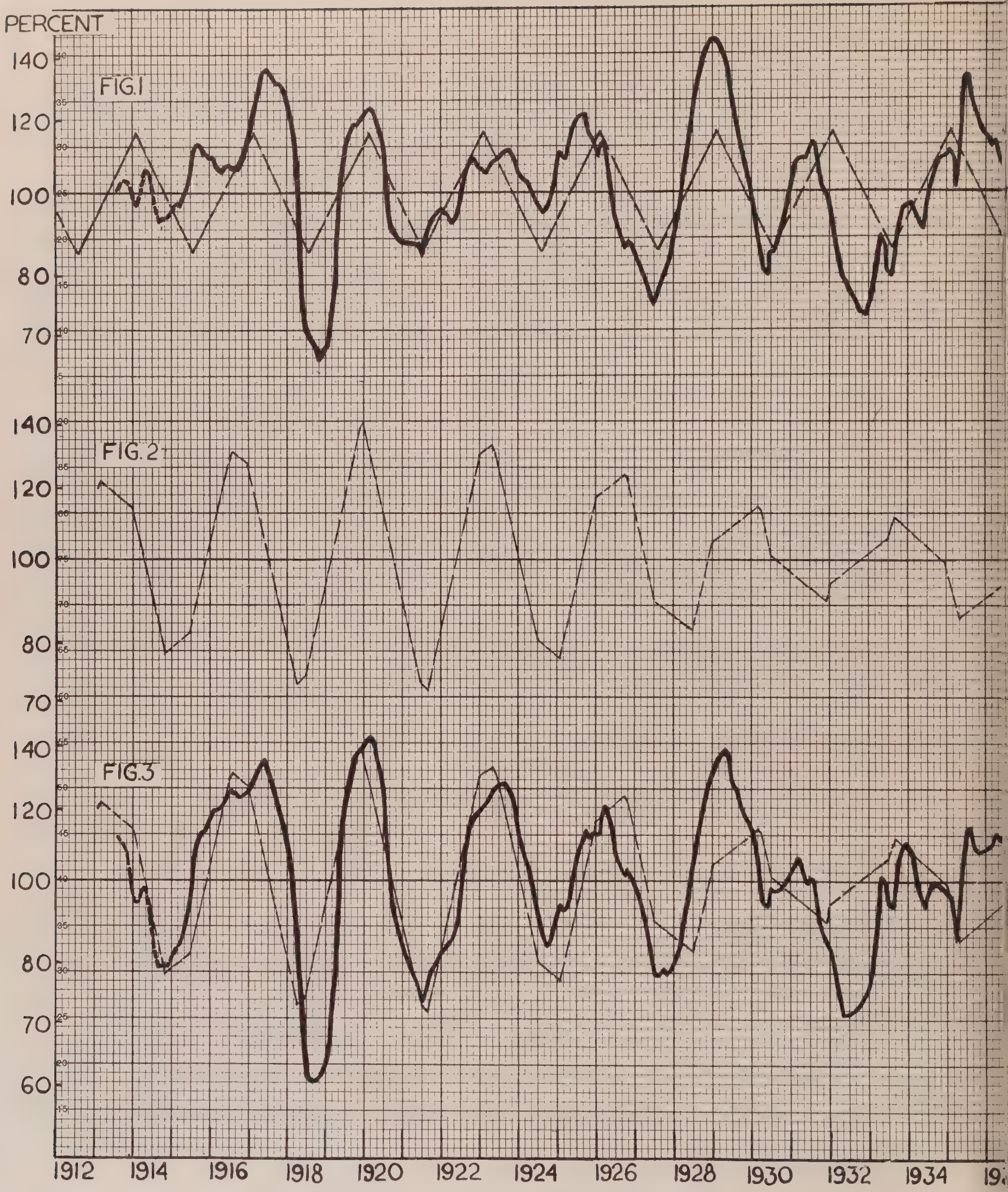
Fig. 1 shows the minor wiggles of factory sales of passenger automobiles as they would have looked if there had been no 41-month cycle. You are used to seeing figures "deseasonalized"—that is adjusted to show what the figures would have been if there had been no seasonal pattern. In the same way the curve in Fig. 1 has been "de-41-monthized."

Fig. 2 diagrams the combined effect of the 36- and 41-month cycles. Naturally when these two cycles are together they enhance each other. When the trough of one is opposite the crest of the other they offset each other.

Fig. 3 shows the minor wiggles of factory sales of passenger automobiles *before* adjustment for the 41-month cycle. That is, it shows them as they actually are, except that the big undulations have been removed and the month-by-month variation has been smoothed out by averaging overlapping groups of 12 months. It is this smoothing process which makes it impossible to bring Fig. 3 (and Fig. 1) up to date.

You may want to see a chart of smoothed factory sales of passenger automobiles as they actually were before trend and long term undulations were removed. If so, refer to pages 288-9 of our report for October 1954. There is evidence that these long term undulations move in 6- and 13-year cycles (see article in the October 1950 and October 1952 reports). After the short term cycles have been isolated we can know about the long term cycles more definitely.

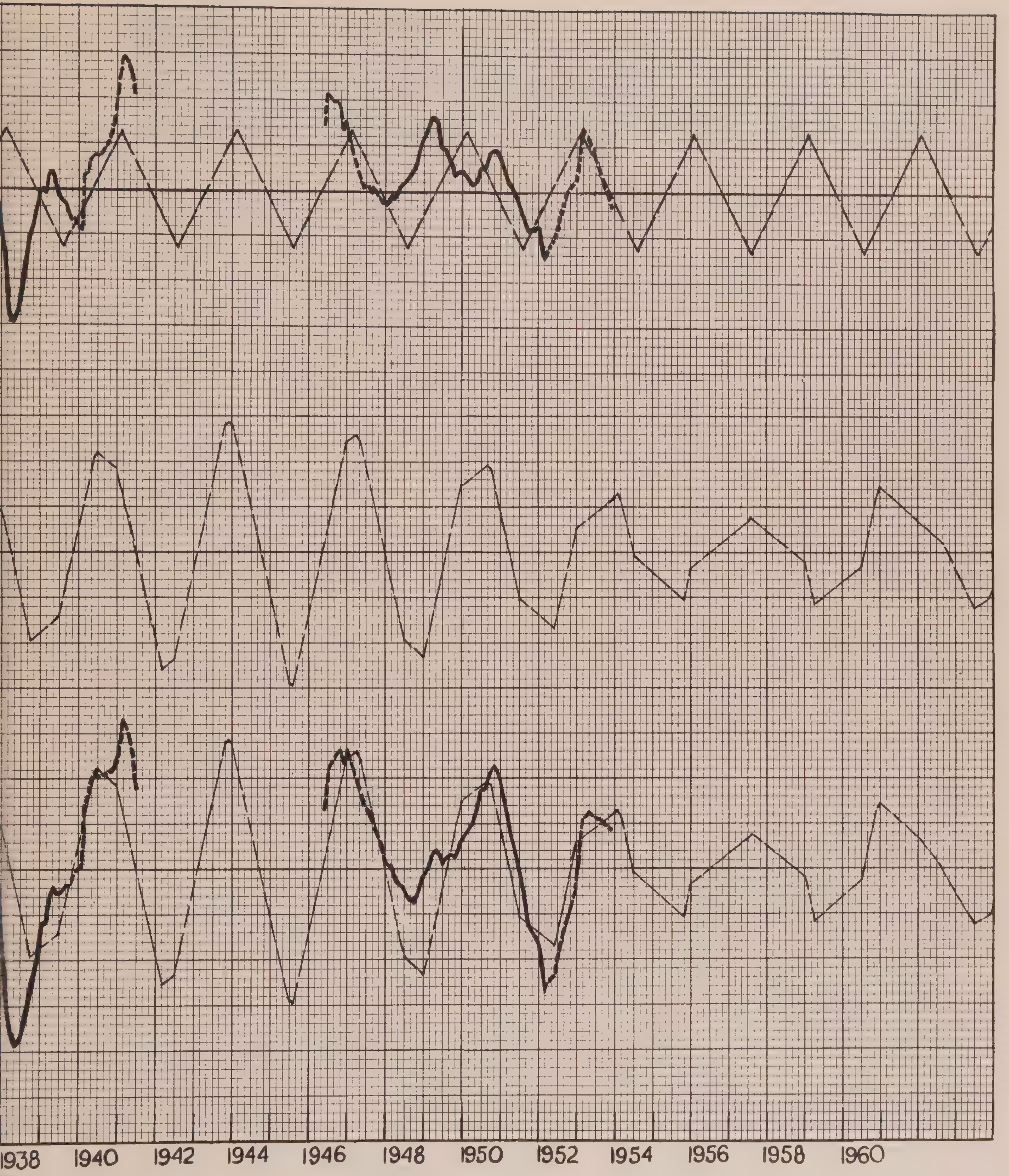
E.R.D.



FACTORY SALES OF PASSENGER AUTOMOBILES

Fig. 1. Factory sales of passenger cars adjusted for trend, adjusted for the effect of the 41-month cycle, and smoothed by a 12-month moving average. (Ratio Scale.)
The broken zigzag line diagrams the 36-month cycle.

Fig. 2. This diagram shows the composite effect of the 36-month and 41-month cycles.



(Ratio Scale.)
Fig. 3. Factory sales of passenger cars adjusted for trend and smoothed by a 12-month moving average. This curve still has the 41-month cycle in it. (Ratio Scale.)

The broken line repeats Fig. 2. It shows the composite effect of the 41-month and the 36-month cycles.

Letters

Sun Spots and Weather

Dear Sir:

I understand that you gave a report at Harrisburg last year to the Pennsylvania Electric Association on the present status of sun-spot cycles and their use in long range forecasting of precipitation...

Our Chief Engineer and General Manager has asked me to determine the present status of knowledge on the influence of solar cycles on weather, particularly with regard to forecasting long term trends in precipitation over a sizeable area such as Ontario.

I would appreciate very much receiving any information, or references to sourcea of information, on this subject which you wish to send along.

Yours truly,

In Reply I Said:

Dear Mr. :

In answer to your recent letter, many aspects of weather, including precipitation, act as if they were influenced by periodic forces; but there is, as yet, no evidence that I know of to prove a cause and effect relationship between solar cycles and weather cycles.

Some of the weather cycles and some of the solar cycles seem to be of the same period or wave length. This fact suggests that the cause *may* be solar or that both the solar cycles and terrestrial cycles may be the result of a common cosmic cause.

Weather cycles are extraordinarily complex and, in the present state of our ignorance in regard to cycles, it is difficult to distinguish between fortuitous cycles and cycles with a truly periodic cause. That is, in analyzing precipitation you are likely to find cycles that are not significant and, on the other hand, might miss cycles that are significant.

I think the problem should be tackled with the thought in mind that you will probably fail, but that when you do, you can pick yourself up and try again.

I have seen day by day forecasts made supposedly solely on the basis of cycles and made several months in advance which seemed to me to be considerably better than one could obtain by chance, but which, even so, may not be good enough to be of practical usefulness.

There seems to be correspondence of wave length between many climatological cycles and many economic cycles, but here again I would say that we do not know enough about either sort of cycles to know for certain that any identity of length is present.

My whole attitude is that a study of weather cycles, especially when integrated with a study of cycles in general, is a most promising field of research and one that should engage your attention. However, we are not far enough along in the subject so that practical results in forecasting precipitation can be *assured*.

Cordially yours,

Paper Dollars

Gentlemen:

Present conditions (in which our paper money in circulation is not well defined in value) are so mixed up that a normal cycle can not be expected to work because most figures are based on these undefined paper dollars. Until 1933 our money was well defined and had a definite metallic value so that cycles had a definite basis to which to refer values.

I would like to know how you can take this situation into account.

Yours truly,
Edward H. Carus

La Salle, Illinois.

In Reply I Said:

Dear Mr. Carus:

I do not see that the debasement of our currency has any particular effect on the short cycles except at the actual moment of debasement.

A 33-month cycle, for example, expresses itself as percentages of trend. Debasement of the currency effects the trend, but not the percentages.

For longer cycles of 40, 50, and 60 years, one has to adjust one's figures to a gold basis.

Very cordially yours,

EMOTIONAL CYCLES IN MAN

By

Rex B. Hersey

(Reprinted from the
Journal of Mental Science, January, 1931)

Foundation Reprint No. 3

FOUNDATION FOR THE STUDY OF CYCLES

EMOTIONAL CYCLES IN MAN

By REX B. HERSEY,

Assistant Professor of Industry, and Research Associate, Industrial Research Department, University of Pennsylvania.

Psychiatrists and psycho-pathologists, on the whole, have never been subject to the error of thinking that a man is a unit whose reaction to a given stimulus does not vary. Their work in the clinic and hospital would quickly force them to give up any such supposition. They naturally look for the conditions under which fluctuations occur and would probably be interested to hear that there are rhythmic changes in man's emotion apparently characteristic of the individual himself. Whether such cycles can be traced to specific factors and principles may be a difficult task to determine. The mere fact of its existence may be of value in making the economist and manager of work mindful of individual factors, as well as of the many impersonal factors in the important question of emotional attitude toward work.

This rather surprising discovery of cyclical fluctuations, if not actual rhythms, came as a by-product of an investigation with a different purpose. Modern employers have begun to accept the theory that high wages and steady employment for their employees pay dividends. It is not so generally admitted that the mental attitude of their employees is of equal importance. Here and there, however, we find a real desire to take the question of mental attitude into account. The employer who expresses such a desire is still handicapped by the lack of real information about the emotions of men at work.

It was as a result of this gap in our industrial knowledge that a large public utility corporation in the East invited the writer, under the auspices of the Department of Industrial Research of the University of Pennsylvania to devote an entire year to the observation of a group of "normal" workers of various occupations, ages, personality types, and nationalities. They were studied carefully in regard to (1) overt behaviour, such as efficiency, lateness, co-operativeness, verbal outbursts, constructive ideas, absenteeism, etc.; (2) emotional behaviour; (3) dominant trends in thought and revery; and (4) such physical and physiological items as could be either detected or measured readily at the works, such as blood-pressure, colloid content of the blood, weight, hours of sleep, illnesses or pains, and feelings of fatigue. Special emphasis was laid on the analysis of the relationships existing between these items and environmental conditions or personality traits.

Such a study involved many real difficulties as to both the technique of fact-finding and the interpretation of the data. Since the number of men who could be kept under observation was limited to some twelve or fifteen at most, the paucity in the number of cases had to be overcome by the thoroughness of the analysis of each case. This called for co-operation in a number of different fields of knowledge; and the writer was very fortunate in securing the collaboration and friendly advice of Dr. Adolf Meyer, of the Johns Hopkins Hospital, Dr. L. L. Thurstone, of the University of Chicago, Dr. S. Dewitt Ludlum and Dr. Morris Viteles, of the University of Pennsylvania, and Dr. W. V. Bingham, President of the Personnel Research Federation. These men were a source of very great assistance and encouragement and the writer cannot express too great appreciation for the help which they have given.

After the fact-finding technique had been roughly agreed upon, the next step was to present the idea of the study to the representatives of the workers and secure their co-operation. They were very willing to assist in every way after they had convinced themselves of the writer's impartiality. The next two weeks were spent in company with the chairman of the worker's committee in visiting the various departments in order to get the best laboratory for the study. Two departments were finally chosen, lying contiguous to each other and involving different working conditions and hours of work. After six more weeks had been spent in these departments to allow the observer to become a part of the scenery, so to speak, and after the workers had begun, of their own accord, to relate intimate problems of their lives, a number of men were picked by the foreman, the worker's representatives and the writer. Each man picked twenty-five workers, and out of the various lists it was found that agreement had been reached on some nineteen workers. The basis for the choice was as follows: they were men of average intelligence, and they liked their job fairly well, possibly a little better than one usually finds. They had no important personality difficulties or physical handicaps tending to prevent proper adjustment. In a sense of the word, they could be looked upon as "normal" workers--the type of man that does not usually come under observation in the clinic. Altogether, seventeen men agreed to co-operate; twelve of these were studied throughout the entire year, the other five were included for periods of several months only. Since that time eight additional cases have been studied with reference to the cyclical changes. The data on which the conclusions are based were supplied primarily by the twelve men who continued throughout the year, though the information obtained in the case of the other thirteen men adds clear-cut confirmation. It is realized that the number of cases observed, only twenty-five in number, is not sufficient to warrant generalization. Nevertheless the evidence *in each case* is enough to raise the question of rhythmical cycles in such a way that a statement of the facts as discovered seems imperative.

The investigation was first pursued for a period of thirteen weeks. Each day was divided into four periods, and a man was usually interviewed four times each day. Shortly after the study began all the men were given a thorough physical examination through the co-operation of the Graduate School of Medicine of the University of Pennsylvania. Some time later most of them were put through a battery of psychological tests in the Psychological Clinic of the University of Pennsylvania. These tests consisted of the Witmer cylinder test, maze C, memory span, Dearborn form board, Stenquist mechanical aptitude test, A-s reaction study, Morgan mental test, and personal inventory C-2. In general, the result from the tests which is of most importance for this paper is that various ranges of normal emotional personalities seem to be well represented, varying from introvert to extrovert and from aggressive to submissive personalities. The scores in the intelligence test for a majority of the workers were lower than had seemed probable from their general appearance and conversation. Physically they were all in good health, only two minor imperfections being found. One man had a tooth abscess and another enlarged tonsils.

After thirteen weeks it seemed best to give the workers a rest. If one goes to a man early in the morning and asks him about everything that has transpired since one last saw him, and then comes round again about eleven o'clock to find if there is any change in his emotional state, and again about two o'clock, and later just before it is time to go home, such questioning has to be handled very carefully if the proper relationship between the observer and the subject is to be preserved. In other words, the investigator must not allow himself to become a nuisance; he must observe the workers as much as possible, and let them tell him their story rather than he always asking questions. Besides spending the whole of the working day in almost constant contact with the workers studied, much of the time after work was also spent with them either in their homes or elsewhere in order to obtain a clear picture of their whole life. All of them had complete knowledge of the purpose of the study, and co-operated fully in describing and analysing their behaviour. After eight weeks' rest the study was resumed for ten more weeks. Another rest period of four weeks followed. The third and final period of the study covered thirteen weeks, though the workers were told that it was to continue four weeks longer than it really did. This was done as another means of preserving a completely satisfactory relationship between them and the observer.

The first question that arises: Did these men tell the truth? There can be no doubt that they did tell the truth as they saw it, except one man, now and then, and I could readily tell when he was lying. One cannot live with a person day in and day out and have him talk confidentially, without his laying bare his true feelings and situation, particularly if one has any skill in drawing him out. This question would, however, be much more important if some less general phase of the data were under analysis. Here we are concerned primarily with the analysis of what may be called average emotional and objective behaviour, rather than with concrete single situations where the determination of the definite cause and effect relationship is the significant objective. Since, moreover, neither the workers nor the investigator realized, while the data were being collected, that a periodicity in man's efforts and emotions was probable, any long-continued series of falsehoods would be likely to destroy the evidence for a cycle, even though such a cycle really were present. This being the case, we may dismiss, at least as far as the cycle is concerned, the question of their veracity.

The next question may be as to the control effect of a study such as this. At the beginning of the study a certain amount of apprehension was felt lest, as a result of the study itself, the workers would learn how to control their output, their emotions, and many other factors in their lives, so that they would be different individuals at the close of the study than they were at its beginning. In order to be able to answer this question as accurately as possible, the observer included himself in the study, and kept a record of his own reactions just as carefully as he did of those of the workers. There seems no doubt that the effect of the study itself on both the workers and the observer was for all practical purposes negligible. Of course, it must be remembered that all the records were kept away from the workers until the close of the investigation. They really had no opportunity or capacity to make use of the records in a way that might change their various emotional responses to any important degree. Moreover, the observer was always very careful never to assume a critical or a suggestive attitude. Such being the case, no control effect could be detected.

The third question which should be answered is the way in which the emotions of the men were measured. So far, no test has been worked out which will readily distinguish when a man is worried, indifferent or happy. The only method, then, which could be used, was the common-sense interpretation of his feeling-tone. The observer first watched the man's actions and general behaviour, his appearance and attitude. From these he attempted to decide in what general emotional state the subject was. If the man's own analysis of his feelings coincided with the opinion of the observer, his emotional state as given was accepted; if there was any doubt, the matter was again brought up later in the day and this later analysis almost always brought agreement. Naturally, such a method cannot fathom completely all the different emotions a man may have, but it would seem to portray with sufficient accuracy the major emotions of men at work.

After the data were secured, the first problem was that of correlation and analysis of the various factors in the industrial and home environment causing variations in efficiency and emotions.

Hitherto the term "stimulus" has often been used to express the causes of our behaviour. Life, however, may be more aptly designated as a series of crises. The expression "crises" has usually been reserved for those important situations which would bring serious consequences to an individual or nation if great care were not exercised to meet them. The loss of a job, marriage, the death of a very important member in a household and divorce are some of the events which we ordinarily consider to be crises or turning points in the life of almost any individual. Whether they are or not depends to a large extent on the individual's own capacity for readjustment. The fundamental idea involved is that a certain situation is presented to which the organism as a whole must make a suitable response. When we consider the ordinary day-by-day activities of human beings, there can be little doubt that the word "crises" connotes much more clearly the inaugurating influences of human reactions than other words that are used more often by psychologists to-day, the most prevalent of which is "stimulus." These crises may be classified as major and minor, though, of course, there can be no sharp dividing line between the two categories. Some of the major crises have already been mentioned; others are--birth, critical illness, the first school day, final examination periods, particularly in European universities, the first job, promotion to an important position, realization of old age. Examples of some of those which would usually be termed minor are as follows: Lack of sleep, wife wants a new car, ate too much, didn't get in the lodge, wife won't cook breakfast, children steal, children fail to pass in school, girl turns him down, foreman tells him off, job goes poorly, weather too cold or too hot to work, work going wonderful, fellow worker tells on him for smoking, can't get material, tools no good, a fellow-worker hurt, and so forth.

One might say that one of the essentials of normality is the individual's capacity to keep these minor crises from becoming major.

The first step in working up the data was to arrange the various crises of a similar nature in the case of each worker under the same heading and to ascertain what the effects were. This work had not proceeded far before it was found that an individual's reaction to the same crises often varied considerably without apparent reason. For example, it was seen that at certain times a job would be going poorly, and yet the worker would laugh the situation off with little emotional tension. A couple of weeks later, with sleep, weather conditions, home relationships and all other circumstances practically the same, so far as one could tell, failure to do a job well would greatly depress the same worker. The same situation manifested itself in regard to the various other minor crises which often recurred in the worker's lives. On many occasions an explanation could be found in the influence of another crisis emanating from some other source as, for instance, a particularly pleasant relationship at home might make the worker much less influenced by the difficulties in his work. These peculiar periods of unusually high and unusually low emotional resistance seemed to follow each other with more or less regularity. In order to portray these changes more clearly, it was resolved to chart the ups and downs of the men's moods, though the difficulties involved were clearly apparent. After considerable thought and discussion with the advisers of the study, it seemed most logical to construct a scale of the emotions in accordance with their effect of the human mechanism, as psychiatric experience suggested. This meant that happiness or elation should have the highest positive value on the scale, since it is the most pleasant emotion one can experience. On the other hand, the most destructive emotion, that which more than all other tends to bring men to an abnormal state, is without doubt worry. It received the most negative value on the scale. In between, the various other emotions that had been recorded, such as apprehension or fear, sadness, pessimism, disgust, anger, peevishness, and suspicion, gradually arranged themselves. Next to happiness or elation came hopefulness or confidence, then a feeling of co-operativeness and interest in the work. After those clearly recognized moods, came three emotional states, for which I was forced to find names after the study had begun--neutral plus, neutral, and neutral minus.

Neutral merely means, "Well, I am not happy; I am not unhappy--I'm just 50-50," as the workers often expressed it.

Neutral plus means a rather pleasant feeling-tone but not happiness. It implies a pleasant, confident feeling of reserve power and energy that will enable us to tackle a task and do it, in spite of a realistic conception of its difficulties. Neutral plus, I would say, is the ideal emotional state for all of us to aim at. Too much elation is not so bad for us as too much depression, but it does have its drawbacks.

Neutral minus is naturally the opposite state to neutral plus. The actual numerical ratings assigned to each of these emotional states are shown in the following table:

RATING SCALE OF EMOTIONS.

Happy—elated	+6
Happy minus	+4 to +5
Cheerful or hopeful	+5
Interested—joking—co-operative	+3 to +4
Neutral plus: pleasant feeling-tone	+1 to +3, usually +2
Neutral: indifferent, tension, equilibrium, mixed	+1 to −1, usually 0
Neutral minus: unpleasant feeling tone; no definite negative emotions clearly defined	−1 to −3, usually −2
Peevish, suspicious, uninterested	−1 to *−2*
Angry	−2 to *−3*
Disgusted	−3 to *−4*
Sad or pessimistic	−4 to *−5*
Apprehensive	−5 to *−6*
Worried	−6

The italicized values were used unless the intensity of the emotional state clearly indicated a greater or lesser score.

Three series of charts were plotted for each worker. One showed his position during the four periods of the day corresponding to the four daily interviews; another chart took the day as an average unit; while the third chart took each week as a unit. All of them showed clearly that emotional tonus varied not only from time to time during the day and from day to day but also, for no accountable reason, seemed to exhibit a longer cyclical trend, apparently characteristic of the individual. The third series of graphs, that taking each week as a unit for ten of the workers picked at random, is presented in this paper as Fig. 1.

In the figure the numerals at the top assign a number to each week of the year during which the investigation took place; while each point in the graph represents an average emotional state for a week. The periods from the 14th to 21st week, and from the 32nd to 35th week inclusive were the times when no observations were made. A weekly emotional state is taken, as a rule, from the average of 22 analytic interviews, Sundays and Saturday afternoons not being included.

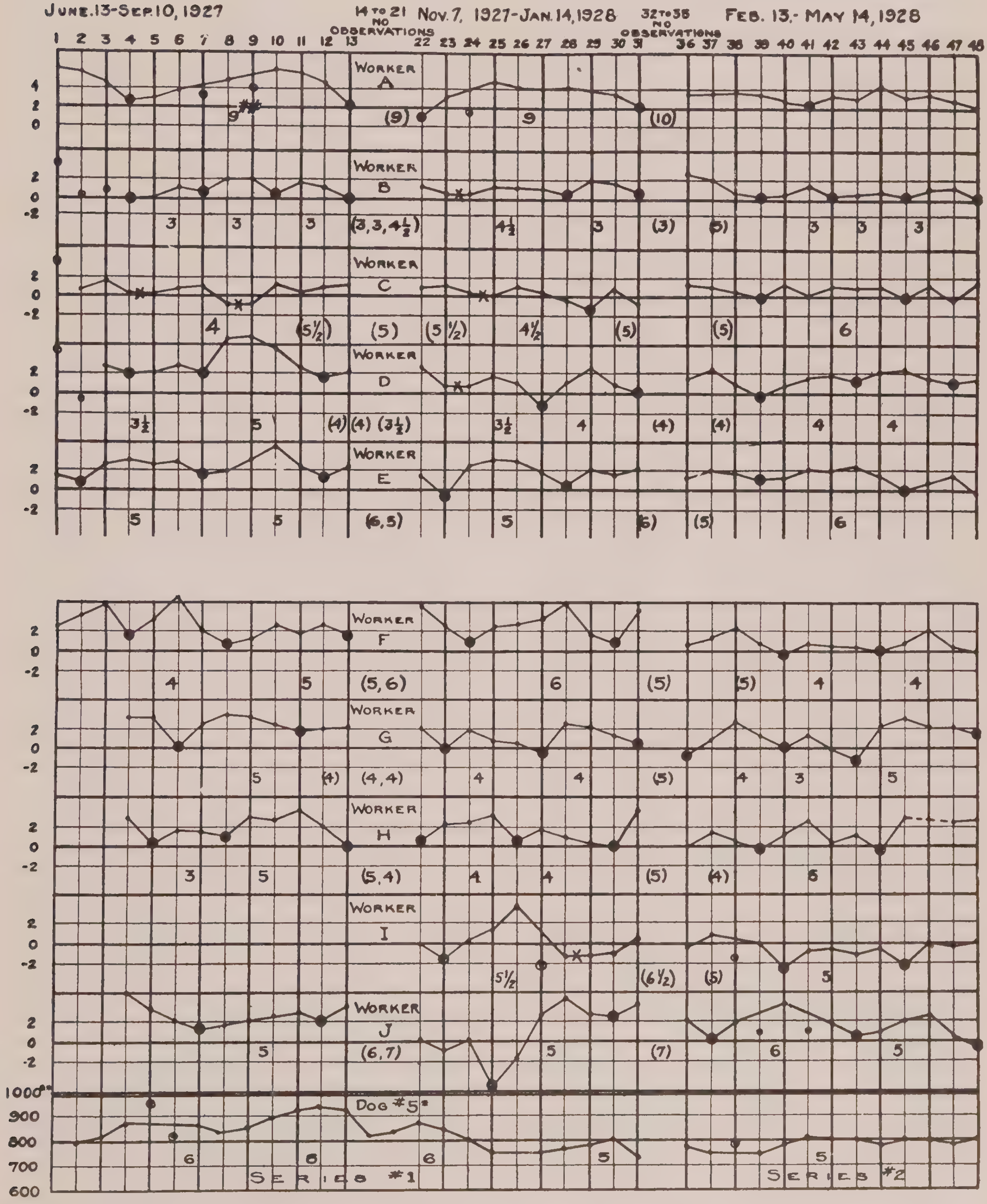
If we take worker "A" we find the first cycle to be nine weeks. To check this hypothesis, to see if there really is anything in this matter of periodicity, one should be able to construct hypothetical cycles for those weeks when no observations were made, and have them show the same cycle lengths as the observed weeks. The numbers in parentheses represent such an effort. The next cycles then run: (9), 9, (10), with a cycle at the close of the study that is probably not complete.

Worker "A" is the oldest man in the study, nearly 60. He is very happily married, has two fine sons and a daughter, all of whom make him justly proud. His position, while he gets only the rating of mechanic, is one of some responsibility in the shop. He claimed, all through the study, that he never changed as other men did. Now it may be that many of us have the same sort of very long gradual change--so gradual, in fact, that we do not realize when we are slipping, when we are down and when we come up. On the whole, he was very happy, practically always above the neutral line. His low periods are marked chiefly by a refusal to joke with his chums, by a withdrawal into himself, and by a readiness to criticize his superiors that was never seen at any other time.

The next man, "B," a helper, is one of the youngest men in the group, 22 years of age, and unmarried. His cycle shows a very small amplitude and covers about three

FIGURE 1

AVERAGE WEEKLY EMOTIONAL STATES OF TEN MALE WORKERS



---

* No. 5 gives supplementary data: average weekly metabolic rate of a dog. Taken from "Exercise and Metabolism in Dogs," A. H. Steinhans, *Amer. Journ. of Phys.*, 1928, lxxxiii, No. 2. Series No. 1 begins with the week of May 10, 1925; series No. 2 begins with the week of June 20, 1926.

** Calories per sq. meter per 24 hours.

These numbers indicate observed cycle-lengths, while those in parentheses are estimated in order to test in another way the factor of periodicity.

weeks. Once his observed cycle length went to 4½ weeks. The interpolated cycles seem to run over twice, once to 4½ weeks, another time to 5 weeks. This is no more than a woman's menstral period might vary, when affected by some unusual cause. During his low periods his usual emotional state was indifference. He had little interest in the way his work was going, and little desire to carry on his art work at home in the evening.

"C," a mechanic working in the open, is in his thirties and is married. He was subject to many temperamental flights during the day. For instance, if he was on a job and it went badly, or if his wife did not treat him as he thought he should be treated, he went down into the dumps. A careful study of his record shows his cycle to run between four and a half and six and a half weeks. A peculiarity in his cycle, not observed in any of the other cases studied, is a sort of secondary or reverberatory decline which several times during the year seems to appear the second week after the usual cyclical decline. This unusual feature is to be noticed in the 11th, 31st, 41st, and 47th weeks.

"D," another helper, is a married man about 28 or 29. His cycles are almost perfectly regular, even to the interpolated ones.

"E," is a man of about 36 and married. In his case the cycle length is always about the same--five or six weeks. One of the other cases will be discussed in detail later.

A study of the list shows that these apparently periodic changes nearly always run within one week of the worker's own average. In other words, if my usual cycle is five weeks, I may have a six weeks' or a four weeks' cycle. If your cycle is usually seven weeks', you may have one of eight weeks or six weeks. But almost never, so far as could be noted, in spite of all the buffets of misfortune, in spite of difficulties at home, in spite of great pleasure and unusual success, does this periodicity depart more than one week either way from its norm.

This is surprising. It is really hard to realize that in the midst of our highly organized civilization, composed as it is of complex human beings, there can be at least a semblance of law and order through all our tangled emotional lives. But what does it mean? Let me give you a general picture of a typical high and typical low period, with the understanding that the details of these periods vary not only for the different individuals, but also sometimes for the different periods in the case of the same person. During the high weeks, a person's drive toward activity in general is greater. He usually goes at his work with vim, and does those things that may have been waiting two or three weeks and which he has put off from day to day. He feels so well physically that, when he goes home in the evening, he wants to go to a picture show or a party instead of going to bed. He anticipates the pleasures of the future, or he plans ways and means of increasing his money-earning power, getting a new automobile, or rising in the world in some way. Almost nothing seems impossible.

What is the other side of the picture? In the lower period it is often a drag to work. If the subject is forced to solve a problem requiring mental effort in planning and physical effort in its accomplishment, he has great difficulty in keeping at it. If compelled to carry on several activities at the same time, he feels the effort most clearly. He does not mind just sitting quietly and thinking, but any task requiring energy, especially creative energy, becomes a heavy burden.

Strange to say, during the high period he tends to sleep less each night. His weight, if the two periods lie close together, is also relatively less during the high period.

What about sexual activity? It is usually greater, and possesses more driving force as a factor in shaping human behaviour, during the high period. Yet, in the case of married workers, one often finds that the frequency of intercourse is greater in the low period than it is in the intermediate periods. This anomaly seems to be caused by a restlessness at night, which the sex activity tends to quiet, rather than by an energic force driving the worker on, as it does during the high period. Naturally he tends to feel tired more often during the low weeks if he is carrying the same load.

In the high period, the way to stimulate him is with a problem. At that time he usually likes to tackle difficult tasks. If he does not do his work quite as his employer would like to have it done, it is no use "telling him off," because criticism just rolls off his back. He feels he is more powerful than his environment; he is the master of his destiny. Yet this energy, when not properly focused on the job, often causes him to get less work done than in the low periods. For instance, he sees his friend Bill over there and thinks of something he wants to tell him, and if there is any way of doing it at all, he stops his work, walks over and has his chat. It so happened, in the case of a certain executive whom I studied, that a greater amount of his own work was always accomplished when he was in a low emotional state. For in his high period he was always calling on other executives, talking to them, and trying to tell them how to run their departments. He just felt so good, he had to share his capability with others. In the low period, however, he stuck to his desk. If anyone came to see him, he growled at him till he got out, and thereby got an immense amount of work done. Thus, as can be seen, there are certain difficulties involved in making a general statement that will hold good for everyone; not only must each person be studied individually, but also the man and his environment must be analysed as a single unit.

Perhaps enough material has been presented to give an idea of the way the cycle hypothesis was formed, the evidence upon which it is based, and its general outlines. But why does it occur? I must admit that, as yet, I have not been able to arrive at a satisfactory explanation of the cause. It does seem to be linked up with changes in the rate of metabolism. Consider Dog No. 5, the very last graph on the chart. It is taken from Dr. A. H. Steinhaus's researches in the metabolic activity of dogs, and represents the weekly average rate of basal metabolism of one dog picked at random. His graph shows, as you will notice, metabolic changes similar to the emotional changes of the workers. No such laboratory tests could be ma on the workers in the study, but observation of their digestive functions seems to indicate differences between the metabolic activities during the high and those during the low periods. The exact nature of the variations could not be determined, but as a rule during the low phase the appetite is less, the faeces drier and thicker, and a greater tendency toward constipation is noted.

A second series of physiological variations seems to be concerned with glandular activity. I have definite evidence only in the case of the sex-glands, but it would seem probable that the whole system of glands is concerned. In the high periods they are more active, or, it may be, the observable results of their previous activity are more evident.

A third factor is one I shall merely mention, namely, a variable relationship within the autonomic nervous system. The sympathetic system seems to be in control most of the time when one is in the high phase. Since the sympathetic system is linked up with the glands and all our vegetative organs, and the glands in turn are linked up with all our bodily activities, there is naturally a relationship between the speeding-up effect of those three factors and the high phase. On the other hand, there is seemingly a slowing down of bodily functions and glandular activity, probably coincident with a rise of parasympathetic control, when one is in the low phase. This series of relationships, at any rate, seems to hold true for the cases studied.

The final physiological variation to be noted is that of blood-pressure. Measurement indicates two possibilities, depending probably on the nature of the individual and his condition: (1) The average blood-pressure, both systolic and diastolic, of some individuals is lower during the low period than in the high week of the same cycle. The pressures of these persons when standing up are, as a rule, higher than when lying down. (2) In other individuals whose pressure, standing, is usually lower than it is lying down, no such clear-cut correlation can be detected, but in their cases the average drop in pressure, standing, is less during the high period than the low.

A survey of bodily changes is, however,

no answer to the question, "Why?" It merely adds another question-mark. The first factor that comes to one's mind as a possible cause is climate. It does not take long, however, to determine that there can be no particular relationship between the cycles and climate conditions unless each person responds very differently to changes in weather conditions; for the emotional cycles of the different men do not move with any sort of agreement, as one would think they should if climate were the basal cause upon which they depended. Since there is no other single influence of which we have knowledge that effects us all so equally without reference to individual conditions, one can only conclude that the basic cause of this very interesting human phenomenon is yet to be found. So far, the data on which the conclusions are based have been presented only in generalized form. It would now seem appropriate to offer another means of judging as to the accuracy of the conclusions by presenting the course of a major crisis in the case of worker"G."

CASE OF WORKER "G."

Worker "G." was a high-strung, sensitive and conscientious employee. His chief difficulties were a too great emotional excitability, and a lack of confidence in his capacity to measure up to the demands of his job. This latter weakness did not manifest itself until a new foreman was placed in charge of his department. Before that his standard of craftsmanship had amply sufficed for the requirements of the work. The new foreman was much more concerned with getting out work of a high standard than the previous foreman had been. Thus in many jobs not only were much higher standards of inspection applied, but also the methods of doing the work were completely altered. It can be easily seen that a worker who had received much of his training under the old system, as "G." had done, might very readily have great difficulty in altering his working equipment so as to meet the new situation adequately. Both temperamentally and circumstantially "G." faced difficult problems of adjustment. He was supposed to be a skilled mechanic competent to perform any item of work in his line, and any known lack of efficiency might lead to his reduction in rank. "G." was also loth to give up his present position because of pension and seniority rights, which were his by reason of almost twenty years' service. Naturally, this struggle to "keep up appearances" placed him under a definite strain. Though "G." cannot be classed as an older worker, yet this situation confronting him is typical in many respects of many such crises confronting the older man in industry to-day. While the results are not always the same, the psychological mechanisms at work are sufficiently similar to add a great deal of interest to the discussion of the way "G." responded to this major crisis.

As might be supposed, the new foreman had been on the job some time, in fact almost two months before the acute phases of the crisis developed. Standards were being gradually tightened, but "G." had no definite clash with the new foreman until December 13 (27th week). During the morning of that day his work went fairly well and he claimed to be on the happy side of life, though the previous day he had been moody and indifferent. In the afternoon he wanted to align a defective crankshaft. However, he encountered a certain amount of difficulty with the two centre journals, which seemed to be off centre. He explained the whole situation as follows: "I did a poor job, though it was the best I could do with the materials at hand. I tried hard to finish and took a chance in order to do so; that is what hurt. I didn't intend to at first, but a couple of the chaps in the machine shop said it was O.K., so I gave in. When C. (the new foreman) hopped me about it he said, 'Don't look so black. If you don't know enough to earn 85c. an hour you'd better quit.' Later he said, 'Forget it.' But I don't know how to take that, so I'm disgusted, downhearted and ready to quit if I had another job."

His production during the afternoon was lowered very much as a direct result of this emotional upheaval. When he left he said he did not know whether he felt tired or not, though he did have a headache from worrying which gave him a tight feeling across his forehead. After he got home he still did not know whether he was tired or not, but none the less he went out to a friend's house because he "couldn't bear to sit about." The next day he remained "disgusted all day as an aftermath of yesterday, with a trace of worry and apprehension thrown in." His mind kept turning over whenever possible the events of yesterday, and pondering over where he could get another job. Production was average, but the effort was much greater. The day after that a reaction set in, when the work went very well. He explained further, "The boss seems O.K., and seems to have forgotten the other day." Though these external conditions without doubt played a part in bringing up his emotional state, it is also likely that his rise to "neutral plus" constituted in part a natural reaction to the extreme depression of the previous two days. Acute emotions of such a painful sort are very wearing on the physical body, and it seems quite general for each depression to be followed sooner or later by a definite reaction toward a happier state. That the acute emotions of the past two days had taken quite a heavy toll is evidenced by the fact that though he went to a party, a rather lively one, that night he "could hardly keep his eyes open." His wife had to keep nudging him. This was in spite of the fact that he had had at least eight hours' sleep the previous night. The morning after the party he woke up tired and remained tired throughout the day, except for a few hours after he had got into the swing of the work in the morning. Both this and the fact that he was held up by the difficulty of getting some work out of the machine shop caused his production to be considerably lowered during the entire day. His emotional state was partly neutral and partly pessimistic.

Though this matter was on his mind now and then we do not again notice any particular results in either his objective or his emotional behaviour until the afternoon of December 22, when C. told him that he was sorry for what he had said about the black looks and for telling him off. This lifted him from "neutral plus" to "happy" all the afternoon. Any logical analysis of this crisis would lead one to think that its effect was now passed. No worker can expect to be perfect all the time in the eyes of a strict foreman, and certainly C. had been very fair in apologizing for his brusqueness. However, the particular incident of the foreman's reprimand was in reality merely a high light in the larger problem of "G.'s" adjustment to the new conditions of his work. On those occasions when his difficulties seemed unusually great he often referred to it, and the probabilities are that it offered a tangible definite situation upon which his mind could focus, and which he distinctly felt to be the beginning of any serious difficulty in holding his job. In spite of C.'s apology, "G." still feared that C. thought him to be an incompetent and unconscientious worker. He felt that not only his capacity but his honour was called into question thereafter in the foreman's eyes, whenever his work went poorly or defects developed.

However, in spite of the difficulties of his work he did not reach the point of acute tension again until February 14 (36th week), nine weeks after the first outburst, though a very evident inclination to be moody without due cause had appeared during the week of January 9 (31st week), four weeks later. He started the week on the 13th somewhat lower than usual, saying, " Everything went along all right, but I don't feel very cheerful to-day." The first period of the following day, Tuesday, was begun in much the same mood. About 9 o'clock, however, he was made partly disgusted and partly worried because a motor on which he had been working was returned for adjustment. He said that it was not his fault, as he had reported to his gang leader that the rod was loose, but that he hated to get others into trouble. C. did not criticize him, and as it was not his fault he admitted he really had nothing to worry about. Things, however, did not seem to work out that way. He said, " I somehow can't help worrying to-day, though at some other time I wouldn't have minded it." The next day his mood had changed very little, the same trouble still being on his mind. He said to me, " I tell you what—if you get hold of a job in your travels let me know ; I'll take it, even if it pays less. The wife was saying last night that I used to come home happy. Now I'm always worried and grouchy and tired. She tries to cheer me up, but it's getting on her nerves too. Such a life takes too much out of you and is not worth it. Every time I get into a jam I swear it will be for the last time, but then someone asks me as a favour to let something go and I do it and trouble ensues. A man gets hell if he does and hell if he don't."

By Friday the acute edge of his low emotional state had worn off. He explained further, " I had a long talk with the wife last night and made up my mind not to worry. If the worst comes and I get fired there are only two of us, and certainly I can get enough of a job to support us. *I didn't worry* and everything went fine. Mental worry takes more out of you than physical labour." His production was higher than it had been on any other day that week. This illustration brings up a number of important problems. Why should " G." drop so low emotionally at this particular time, though the objective reason for it was much less important than others that at other times had exercised much less effect ? Physically he did have a very slight trace of cold, but not enough to be termed a major factor in causing him to have such a low emotional resistance. Furthermore, an interesting point is raised when we question how much effect his resolving not to worry any more had. If we could all so regulate our mental and emotional processes that by a mere resolution we could stop ourselves from acute worry or apprehension, there is no doubt that we would solve our problems much more satisfactorily and sensibly. However, the ordinary experience of mankind is to the effect that such a happy state of mental and emotional control cannot be reached by the mere magic of saying, " I shall not worry about this or that." Only three days previously " G." was saying that he had nothing to worry about in regard to that particular situation, yet he could not desist. It is very likely, of course, that the catharsis of talking the whole situation over with his wife, and thereby getting a clearer perspective of the difficulties and possible outcome involved, led " G." to realize that his whole life would not be completely ruined even if he did lose his job. During the week of March 12 (40th week) he was again in a depressed state, but seemed unable to connect it with any definite factor in his home or working relationship.

Yet beginning with Sunday, April 1 (43rd week), practically the same situation of the week of February 13 duplicated itself. Even in spite of a change in working conditions that enabled him to have Sunday of one week and Wednesday of the next week off instead of merely one Sunday every two weeks, he did not recover until Friday afternoon. While at Asbury Park on Wednesday he could not get the thoughts of the work-a-day situation out of his mind. The results on Monday of the next week show an entirely different attitude. On Monday he said in the first period, " I came in fine this morning and in different mind from last week. I lit into it and installed a new clutch." At the end of the day he said, " The work went fine, and my physical condition was so good it kept me up, in spite of wondering how the road test would turn out and the problem of what to do with mother. She is worse and shouldn't be left alone." All through the day he was neutral plus or better.

As far as could be determined no active effort was made to cease worrying, yet the results are very much the same as they were when he did so resolve On the Monday previous, when he was worried all day he said, " It is no use denying it, C.'s got my goat. I can't forget the telling off I got several months back. I get excited now if things don't go right and can't do as well as I ought to. It seems I haven't got the confidence in myself I used to have under Witmer (the former foreman). I could kid back with him. I'm almost ready to tell them to take their damn job. The wife says, ' Stop worrying; there's only us two, and I know you can make enough for us to live on.' I try not to worry, but often it gets the better of me, particularly when I'm a little blue anyway."

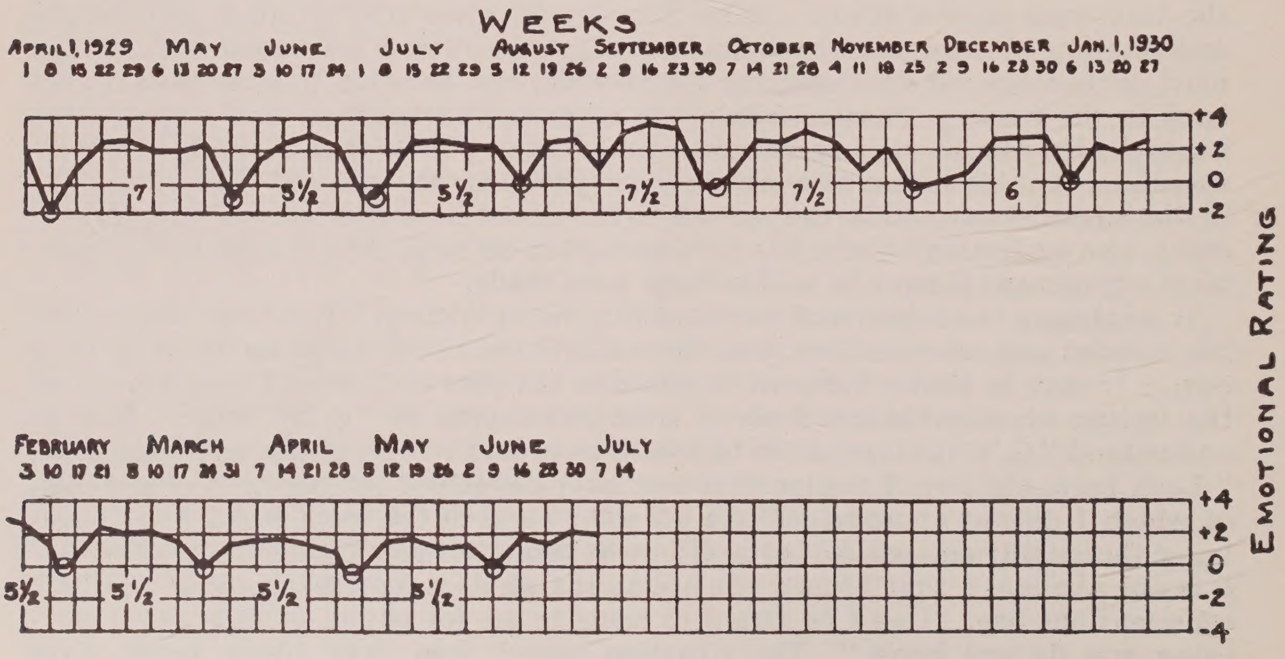
Though the problem was often in his mind and tended to lower his general emotional state, the next acute stage occurred some five weeks later—in fact, during the last week of the study. Some four weeks after that another unfortunate combination of external circumstances and low emotional resistance induced the most acute stage yet developed, as the observer had occasion to learn from a visit back to the works. Physical symptoms of persistent tiredness and a continuing headache led him to visit his doctor, who advised him to take a couple of weeks' vacation. On his return to work the same problems still showed themselves, but in diminished form, and in the year which has passed since that time a slow improvement, also cyclical in nature, has been noticed in his case, though even to-day complete adjustment cannot be said to have been made.

In analysing the causes and course of this major crisis in " G.'s" life we see two fair-minded and conscientious men thrown into conflict through no desire of their own. It may be that a different attitude on the part of C. would have prevented the feeling of culpable insufficiency from developing in "G.'s" mind. Had C. understood "G.'s" nature better he would have said to him at the very beginning, " Look here, old boy, I realize that you have developed lax methods of working, of which I do not approve. There are some parts of the work which you do not know thoroughly enough, but even if I do at times tell you off, just remember that it is not personal; that I know you are on the whole a good mechanic as well as a conscientious one. Don't be afraid to come to me for advice or help about anything you do not know." The situation would then very likely never have

developed to the acute stage it did. It is true that on February 21, C., for the second time, did tell "G." to forget about his reprimanding him two months before. He also told "G." to come to the office if there was anything he wanted to know and he would either show him or find it out for him. "G." remarked at the time, "That was nice of him." We must conclude, then, that as foremen ordinarily go C. did his best to handle the problem very sensibly. His chief fault lay in the fact that he did not realize "G.'s" nature until the feeling of inferiority had been too thoroughly grounded in him. Moreover, when C. at the time of the first reprimand told "G." he had better look for another job if he didn't know enough to earn 85c. an hour, he injected a personal element into the relationship between the two of them that could not be entirely eradicated from "G.'s" mind except by kindly actions over a long period of time.

So far, instances of manual workers have been cited. Among the other eight cases studied since my formal investigation was brought to a close were included an artist, two students, two insurance salesmen, a college professor and a draftsman. In all of them the same cyclical fluctuations in emotional tonus was clearly manifested. None of them were studied for over four months, with the exception of one man whose chart I now reproduce. This chart, as will be noticed, runs from the week beginning April 1, 1929, until the week beginning July 7, 1930. The cycles run clearly between 5½ and 7½ weeks, the average being slightly over 6 weeks. During this time this subject's outward conditions were very different, and yet, in spite of all those varying changes his cycle did not vary by more than two weeks. During that whole time, likewise, only two weeks were thrown out of line. The first was during the week of September 2nd, when the fact that he had put off work which he should have done during the high weeks of August 19 and 26 led him to be depressed for several days

FIGURE II



AVERAGE WEEKLY EMOTIONAL STATE OF SUBJECT "K" during the following week. The low week of November 11 is out of line because of a great loss of sleep.

It would seem as if sufficient data have been presented to give you a clear idea of the way in which the periodic cycle in men functions. What should we do about it? Two general courses of procedure present themselves. On the one hand, we may feel we should do everything possible to eliminate the cycle. We may consider it is enough to be compelled to worry about our daily variations in mood and efficiency, which may be due to definite causes such as indigestion, lack of sleep, illness, or difficulties in our work. Unfortunately, that ambition cannot be fully realized until the cause of the periodic changes is discovered; yet it is true that the whole trend of our modern civilization is towards demanding a man without variations, a man who can be on the job punctually every morning and function in many ways as a machine throughout the day. Such a tendency, without doubt, adds weight to the argument that the cycle should be eliminated. One cannot, however, as yet answer with definiteness whether the mechanization of the human element would prove advantageous in the long run or not. Human nature does not seem, however, to have functioned at any time in such a precise manner. Even the slave could not be forced to do so. The Indian fought or hunted, and then enjoyed a period of inactivity. Practically all uncivilized peoples tend to follow such alternating periods of activity and relaxation. We seem to be getting away from that practice, but the evidence offered by this study shows the human mind and body still functioning in long rhythmic movements that the new tendencies cannot alter. The same man at various times may possess as widely contrasting emotional characteristics as are exhibited by two different individuals.

Personally, I would like to say that I am able to forecast the general appearance of my own low periods, with advantage to myself. My cycle runs between 5½ and 6½ weeks. During my low period I am in a very critical mood and do not like to be bothered. At such times I enjoy solitude, and employ the time as much as possible in research work or in the laboratory. I refuse to accept engagements where I shall have to talk in such a way that it is a question of giving myself away.

During my high period, I enjoy consultation work and activities that require a lot of energy and vitality. Unfortunately I sometimes become too restless to confine myself to a long-continued task requiring careful minute work. In many ways I have to be more careful of my high period than my low period, or else I may be led into trouble.

I would like to insist that the discovery of these rhythmical cycles does not invalidate in any way the previous work done by men in this field. The emotions of man, from the scientific standpoint, are largely unplumbed, and this is merely one effort to understand more fully the laws which govern their functioning. I trust it may be of some real service to those who are required to deal in human reactions, by throwing a little more light on the causes of man's emotional behaviour.

In view of these considerations, are we not then justified in accepting the existence of periodic changes in mood and ability as something akin to a fundamental law of our nature, and in endeavouring to adjust our lives to its demands?

(Further studies in this field conducted in both the United States and Europe—more than a hundred persons have been studied for periods ranging from four months to several years—confirm the findings described in this article. Professor Hersey is now engaged in studying various internal functions of the human body in order to discover possible correlations between these and the emotional cycles. ED.*)*

Mr. H. A. Musham
741 No. Rush St.
Chicago, Ill.

Feb.
#3011

WANTED
BACK COPIES OF "CYCLES"

We will pay $1 each for copies of the following reports:

June 1950
September 1950
January 1952
October 1953

FOR SALE
BOUND SETS OF "CYCLES"

While the supply lasts, 1950, 1951, 1952, 1953 at $9.90 per volume.

FOR SALE
SETS OF "CYCLES"

Sets of back copies at the following prices:

1950 October, November, and December. $2.00
(All five issues, if we get them, $5.00)
1951 All ten issues. 5.50
1952 All ten issues. 5.50
(We will refund 50¢ if we are unable to supply the January issue.)
1953 All ten issues. 5.50
(We will refund 50¢ if we are unable to supply the October issue.)

FOR SALE
SINGLE COPIES OF "CYCLES"

Individual back copies of reports $1.00 each. (For partial list see inside of back cover.)

FOUNDATION FOR THE STUDY OF CYCLES
680 WEST END AVENUE
NEW YORK 25, NEW YORK